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Rocky Flats Environmental Technology Site

RECONNAISSANCE-LEVEL CHARACTERIZATION REPORT (RLCR)

BUILDING 371 CLUSTER

REVISION 0

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ABBREVIATIONS/ACRONYMS

ACM	Asbestos-Containing Material
ARA	Airborne Radioactivity Area
ASD	Analytical Services Division
Be	beryllium
CA	Contamination Area
CAM	Continuous Air Monitor
CBDPP	Chronic Beryllium Disease Prevention Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CSV	Central Storage Vault
CWTS	Caustic Waste Treatment System
D&D	decontamination and decommissioning
DACS	Data Acquisition and Control System
$\underline{DCGL_W}$	Derived Concentration Guideline Level, Wilcoxon Rank Sum
$\underline{DCGL_{EMC}}$	Derived Concentration Guideline Level, Elevated Measurement Comparison
DCHP	Dicesium Hexachloroplutonate Preparation
DDCP	Decontamination and Decommissioning Characterization Protocol
DOE	U.S. Department of Energy
dpm	disintegrations per minute
DQOs	data quality objectives
DWS	domestic water supply
EPA	U.S. Environmental Protection Agency
FCA	fixed contamination area
GB	Glovebox
HCA	high contamination area
HEPA	high efficiency particulate air
HVAC	heating, ventilation and air conditioning
IHSS	individual hazardous substance site
I/O	input / output
K-H	Kaiser-Hill
KOH	potassium hydroxide
LBP	lead-based paint
LCS	laboratory control samples
LKBA	List of Known Beryllium Areas
LLW	low-level waste
LS/DW	Life Safety/Disaster Warning
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	minimum detectable activity
MDC	minimum detectable concentration
NaOH	sodium hydroxide
NFA	no further action
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
OS&IH	Occupational Safety and Industrial Hygiene

OAU	outside air unit
PAC	potential area of concern
Pb	lead
PCB	polychlorinated biphenyls
PPM	parts per million
PROVE	Plutonium Recovery Operations Verification Exercise
Pu	plutonium
PuSPS	Plutonium Stabilization and Packaging System
PVC	poly-vinyl chloride
RBA	radiological buffer area
RCRA	Resource Conservation and Recovery Act
RDL	required detection limit
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RLC	reconnaissance level characterization
RLCP	Reconnaissance Level Characterization Plan
RPD	relative percent difference
S-R	stacker-retriever
SAAM	selective alpha air monitor
SAU	supply air unit
SNM	special nuclear material
SS&C	sand, slag and crucible
SVOC	semi-volatile organic compound
SWGR	switch gear
TCLP	Toxicity Characteristic Leaching Procedure
TGEN	turbine generator
TGS	Tomographic Gamma Scanner System
TSI	thermal system insulation
TRU	transuranic
UBC	under building contamination
UPS	Uninterruptable Power Supply
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

A Reconnaissance Level Characterization (RLC) was performed to assess physical, chemical and radiological hazards associated with the 371/374 Building Cluster (i.e., B371, B374, B373, B374A, B377, B378, B381, and the cluster tanks). The office building (B376) and office trailers (T371K, T371H/J and T376A), which constitute SET 15, and environmental media beneath and surrounding the facilities were not within the scope of this characterization. SET 15 will be characterized at a later time. Hazards were assessed based on a review of historical and process knowledge, historical radiological and chemical data, and newly acquired RLC data.

RLC results indicate the presence of radioactive contamination within B371 and B374, and possibly within the vapor effect tanks and the spray dryer. Radioactive contamination is present on surfaces (e.g., floors, walls and equipment) and in equipment and building systems (e.g., gloveboxes, process tanks and lines, and ventilation ducts). Some areas and equipment/systems have high levels of radioactive contamination. Also, radiological hazards are associated with the presence of in-process nuclear material, nuclear material holdup, other radioactive materials (e.g., containerized special nuclear material and calibration sources), and radioactive and mixed waste. In addition, some radioactive contamination was detected on metal roofing, but the contamination may be due to naturally occurring radioactive material (i.e., radon decay products). This contamination will be further investigated.

Residual amounts of toxic metals, organic solvents, and beryllium are present inside gloveboxes, process equipment and tanks, related piping, and plenums. Some equipment may contain PCB-contaminated oils. B371 also contains considerable amounts of lead shielding, and numerous gloveboxes, equipment and containers are lead lined. Asbestos-containing material is present in most of cluster buildings in several forms (e.g., floor and ceiling tile, mastic, and insulation). Some buildings have fluorescent light ballasts containing PCBs. In addition, chemical hazards are associated with in-process nuclear material, and hazardous and mixed waste.

Contaminated areas, other hazards, and related facility classification are summarized in Table ES-1. Based upon this RLC, and subject to concurrence by the Colorado Department of Public Health and the Environment, Building 371 is considered a Type 3 Facility, and Building 374 and Tanks 224 – 228 and 167 – 169 are considered Type 2 Facilities. Buildings 373, 374A, 377, 378 and 381, and Tanks 163 – 165, 170, 262 and 262A are considered Type 1 Facilities. Facility types, as defined in the Decommissioning Program Plan, are defined as follows:

Type 1 facilities are considered "free of contamination".
Type 2 facilities contain no significant contamination or hazards, but are in need of decontamination.
Type 3 facilities contain significant radiological contamination and/or hazards.

The Type 1 facilities were characterized in accordance with the requirements for Pre-Demolition Surveys, pursuant to the D&D Characterization Protocol (MAN-077-DDCP). To ensure that these facilities remain free of contamination and that Pre-Demolition Survey data remain valid, isolation controls will be established, and the facilities will be posted accordingly.

After equipment has been removed from the facilities and the facilities have been decontaminated, the demolition of these facilities will generate primarily uncontaminated rubble/structural construction debris, sanitary waste, and low-level radioactive waste. Most process-related equipment items, including ventilation systems, gloveboxes, and machinery are likely to be disposed of as radioactive waste. The Site plans to recycle most or all of the uncontaminated rubble/structural construction debris. Relatively small amounts of hazardous, toxic and asbestos-containing waste are anticipated.

Table ES-1 Summary of Hazards Indicated by the RLC

Building/ Facility	Chemical Hazard Indicated?	Hazard Type	Location	Radiological Hazard Indicated?	Hazard Type	Location	Building Classification[1]
B371	**Yes**	Asbestos Metals, organic solvents, beryllium (Be) & PCBs	Multiple, including roofing material, panels, tiles & insulation. As residual inside gloveboxes, equipment, tanks, piping and plenums.	**Yes**	Fixed and removable alpha contamination[3]	Extensive; on interior bldg surfaces, on & in equip. & systems, and metal roofing.	Type 3
B374	**Yes**	Asbestos Metals, organic solvents, Be & PCBs	Multiple, including roofing material, panels, tiles & insulation . As residual inside tanks, equipment and piping	**Yes**	Fixed and removable alpha contamination[3]	Various; on interior bldg surfaces, on & in equip. & systems, and metal roofing.	Type 2
B373	**Yes**	Asbestos	Transite panels & piping insulation	No	None found	NA[2]	Type 1
B374A	**Yes**	Asbestos	Ceiling & floor tile, and insulation	No	None found	NA[2]	Type 1
B377	**Yes**	Asbestos	Transite panels, ceiling & floor tile, and insulation	No	None found	NA[2]	Type 1
B378	**Yes**	Asbestos	Piping insulation	No	None found	NA[2]	Type 1
B381	**Yes**	Asbestos	Ceiling & floor tile and insulation	No	None found	NA[2]	Type 1

[1]Building classification does not include environmental media or bulk media beneath the immediate surface of the floors.

[2]NA = Not Applicable

[3]Contamination to be investigated; activity may be from naturally occurring radioactive material (i.e., not DOE-added material).

Radiological Engineering recommends surveys of Type 2 and 3 facilities where significant configuration changes are implemented in the building prior to demolition due to unknowns associated w/ movement of bulk material or equipment.

Type 1 facilities are considered "free of contamination," and Type 2 facilities contain no significant contamination or hazards, but are in need of decontamination. Type 3 facilities contain significant radiological contamination and/or hazards.
The presence of asbestos and PCB fluorescent light ballasts does not make a facility a Type 2 as long as asbestos and ballasts are removed pursuant to Site asbestos abatement and waste management procedures.

Table ES-1 Summary of Hazards Indicated by the RLC (Continued)

Building/ Facility	Chemical Hazard Indicated?	Hazard Type	Location	Radiological Hazard Indicated?	Hazard Type	Location	Building Classification[1]
Tanks 163 – 165, 170, 262 & 262A	**Yes**	Asbestos	Some piping insulation	No	None found	NA[2]	Type 1
Tanks 224 – 228 & 167 - 169	**Yes**	Asbestos Acid & caustic Metals, organics & Be	Some piping insulation Some product tanks Vapor effect tanks (3) and spray dryer (1)	**Yes**	Internal contamination Fixed alpha contamination[3]	Vapor effect tanks and spray dryer Exterior	Type 2

[1]Building classification does not include environmental media or bulk media beneath the immediate surface of the floors.

[2]NA = Not Applicable

[3]Contamination to be investigated; activity may be from naturally occurring radioactive material (i.e., not DOE-added material).

Radiological Engineering recommends surveys of Type 2 and 3 facilities where significant configuration changes are implemented in the building prior to demolition due to unknowns associated w/ movement of bulk material or equipment.

Type 1 facilities are considered "free of contamination," and Type 2 facilities contain no significant contamination or hazards, but are in need of decontamination. Type 3 facilities contain significant radiological contamination and/or hazards.
The presence of asbestos and PCB fluorescent light ballasts does not make a facility a Type 2 as long as asbestos and ballasts are removed pursuant to Site asbestos abatement and waste management procedures.

1.0 INTRODUCTION

As part of the Rocky Flats Environmental Technology Site (RFETS) Closure Project, numerous buildings and structures will be removed. Among these is the 371/374 Building Cluster (i.e., B371, B374, B373, B374A, B377, B378, B381, and the cluster tanks). This cluster is located in the northwestern part of the Industrial Area (see Figure 1-1). Facilities within the cluster will no longer support the RFETS mission, and will need to be demolished to reduce Site hazards, risks and/or operating costs.

Before the facilities can be demolished, hazards must first be identified. Hazards identified will be used to plan the decommissioning and demolition work, including addressing worker health and safety and waste management issues. This document presents the existing physical, radiological and chemical hazards associated with the cluster buildings, and classifies the facilities pursuant to the RFETS Decommissioning Program Plan (DPP, K-H, 1998a). The hazard assessment is based on facility histories and process knowledge, operating and spill records, and results of the reconnaissance level characterization (RLC) conducted. The document also presents estimated decommissioning waste types and volumes. The RLC was conducted pursuant to the RFETS Decontamination and Decommissioning Characterization Protocol (MAN-077-DDCP). The content and general outline of this report is consistent with Kaiser-Hill (K-H) guidance on the composition of decontamination and decommissioning (D&D) documentation (Facility Disposition Program Manual; FDPM; K-H, 1998b).

1.1 Purpose

The purpose of this report is to communicate and document the results of the RLC effort. The purpose includes summarizing the data into a concise, usable format and interpreting the data for use in management decisions, primarily:

- definition of individual hazards and overall risk associated with facility D&D and managing resulting wastes;
- preliminary waste classification based on RLC results; and
- classification of buildings based on hazards identified.

1.2 Scope

This report covers physical, radiological and chemical characterization of the Cluster buildings (i.e., B371, B374, B373, B374A, B377, B378, B381, and the cluster tanks). The office building (B376) and office trailers (T371K, T371H/J and T376A), which constitute SET 15, and environmental media beneath and surrounding the facilities were not within the scope of this characterization. Historical releases are addressed in the *Final Historical Release Report for the Rocky Flats Plant* (21100TR-12501.01).

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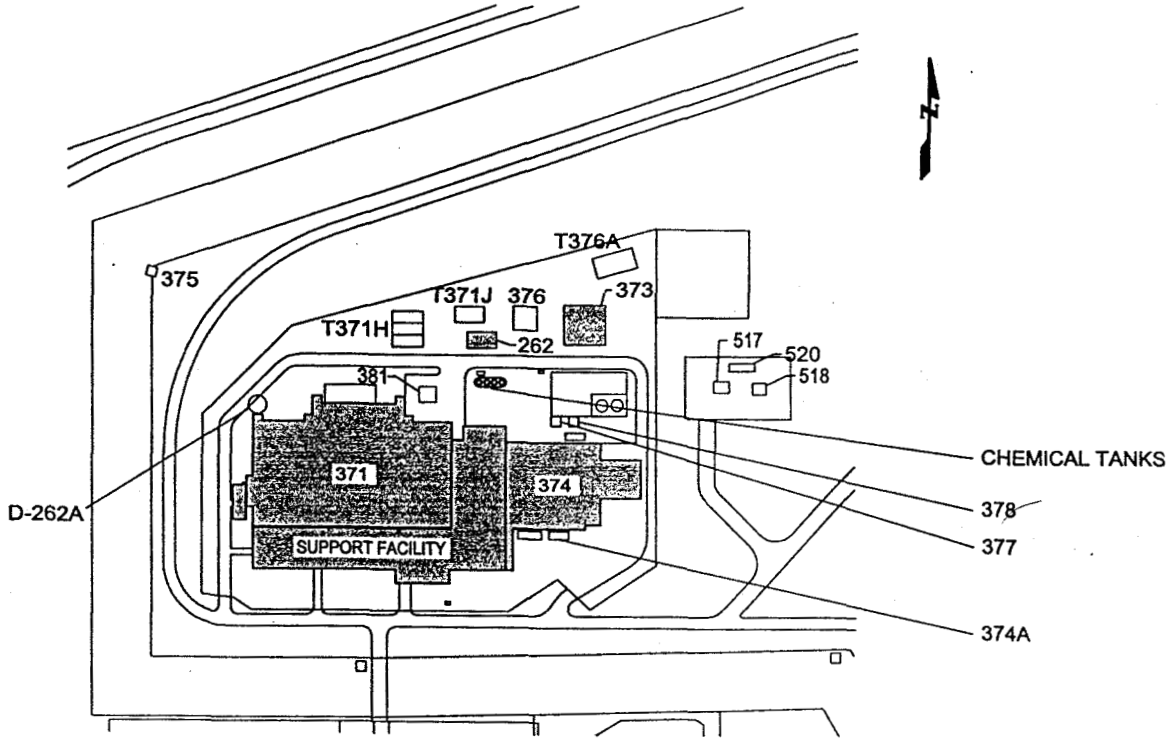
Figure 1-1 Building 371/374 Cluster Map



2.0 OPERATING HISTORY AND PHYSICAL DESCRIPTION

The 371/374 Building Cluster includes the following facilities:

- B371, one of the major RFETS plutonium recovery facilities
- B374, the major RFETS process wastewater treatment facility
- B373, the cooling tower for B371 and B374
- B374A, a small carpenter's shed
- B377, the air compressor building for B374
- B378, the waste collection pump house for B374
- B381, the old fluorine building for B371
- 371/374 Building Cluster exterior tanks (T163 – T165, T167 - T170, T224 – T228, T262 & T262A)

Descriptions of these facilities and their operations are presented below. D&D planning and execution for the 371/374 interior will be conducted by SETs, which are small, manageable groupings of similar areas and equipment that can be worked independently. There are 16 SETs within 371/374 (see below).

- SET 1 – B371 attic and chemical makeup area
- SET 2 – B371 main aqueous processing area
- SET 3 – B371 residue processing areas
- SET 4 – B371 Central Storage Vault and associated rooms, including sub-basement
- SET 5 – B371 utility areas and dissolution
- SET 6 – B371 fluorination area
- SET 7 – B374
- SET 8 – B371 labs, vaults and processing areas
- SET 9 – B371 office and support areas, maintenance and cold labs
- SET 10 – B371 processing area (PUSPS), room 3701
- SET 11 – B371 vaults and drum storage area
- SET 12 – B371 hallways, stairwells, and MCC area
- SET 13 – B371 remaining ventilation
- SET 14 – 371/374 Building Cluster tanks
- SET 15 – Offices outside B371 (outside RLC scope)
- SET 16 – 371/374 Building Cluster ancillary buildings (e.g., B373, B374A, B377, B378 & B381)

Hazards associated with facilities covered by this RLCR are summarized by facility and SET in Section 4.0. Facilities in SET 15 include B376, T376A, T371H, T371J and T371K, and will be characterized at a later time.

2.1 Physical Description of Building 371

The Plutonium Recovery Facility, Building 371, is a four-level building of reinforced concrete containing approximately 315,022 square feet of floor space. The ground floor of the facility, excluding the north extension that houses the emergency generator and

electrical switchgear, is approximately 330 feet long by 180 feet wide, over a basement of the same length but 250 feet wide. (The Support Facility covers the remaining portion of the basement.)

The four levels of the Plutonium Recovery building are designated as the +60, +80, +100, and +115-foot levels. The +60-foot level is the sub-basement, consisting primarily of the lower part of the plutonium storage vault and the stacker-retriever maintenance bay. The +80-foot level is the main basement, housing heating, ventilation, air conditioning (HVAC) equipment and mechanical utilities, the upper part of the plutonium storage vault and maintenance bay, and small plutonium processing areas. The +100-foot level is the ground floor, containing the majority of the plutonium recovery processing equipment. The +115-foot level is the attic, which provides protected space for air distribution systems, chemical piping, electrical conduit, and two motor-generator sets. The upper portions of the tank vaults, the incinerator canyons and scrubbers, the high specific activity (HSA) drum storage bay, and the secondary recovery canyons intrude into the attic from the ground floor below. Stairways and an elevator provide access to the various levels, and airlock double doors facilitate movement of personnel and material within the complex.

2.1.1 General Construction and Foundation

The Plutonium Recovery building, Building 371, is "hardened" to ensure that it meets the design criteria for the containment of particulate radioactive material. As used here, "hardened" is defined as constructed to withstand the forces imposed by a design-basis earthquake and/or tornado. The hardened construction includes not only the exterior walls and roof and those parts of the building where actual plutonium recovery operations are conducted, but also all portions that house equipment or systems essential to the recovery process or required to contain the plutonium within the building.

Building 371 rests on reinforced concrete caissons, cast in place in holes drilled into bedrock. The Building 371 footing/foundation contains approximately 400 caissons. The maximum length of the caissons is 48 feet and the maximum diameter is 6 feet. The caissons are capped with concrete pads, and concrete grade beams are cast in place atop the capped caissons. The grade beams are cast integrally with concrete basement floor sections to form a monolithic supporting structure. Void-forming material is used between compacted backfill and the grade beams and floor.

Since ground water is present above the basement floor level (which is approximately 16 feet below the existing ground surface), a combined subsurface drainage system is included in the design for Building 371. The drainage system, connected to gravity outfalls, prevents hydrostatic pressure on the sub-basement and basement walls and floors. The subsurface drainage system consists of porous concrete pipe laid around the perimeter of the area. Each perimeter pipe drains into a gravity outfall pipe that reaches the surface and drains into North Walnut Creek, above the monitoring ponds. Below and above grade, the framing consists of walls, columns, and beams, including roof beams, of reinforced concrete.

2.1.2 Walls

The exterior walls, both below and above grade, are cast-in-place reinforced concrete design to withstand the forces imposed by a design-basis earthquake or tornado and still function as a final containment barrier for radioactive materials. Exterior storage vault walls are 14 inches thick.

The interior walls, elevator walls, and stairway walls are constructed of poured-in-place concrete. Most other interior walls are also of concrete. Walls divide process areas into compartments separated by wide access corridors. Additional walls within the compartments form tank vaults, process canyons, and control rooms. Canyon and tank vault walls are concrete 2 feet thick, for some protection from radiation if there should be a nuclear excursion in the primary solution storage tanks. In areas other than canyons and storage vaults, the walls are of sufficient thickness to protect personnel from day-to-day radiation exposure, or to act as containment barriers or fire stops.

Interior walls in the Support Structure, which includes offices, locker rooms, and Cafeteria are steel-stud construction covered with drywall and gypsum board panels. The Support Structure walls may have been initially painted with lead based paints as the Plant Site used lead-based paints until the 1980's. The joint taping compound may have contained asbestos when it was applied to the joints. Other interior walls as in restrooms and shower rooms have metal lath and plaster covered with ceramic tile. Office walls have a variety of wall coverings over steel-stud construction. Some of the wall panels are pre-covered gypsum board panels.

2.1.3 Floors

The floors are poured-in-place, reinforced concrete. Most process room floors have epoxy finish for easier decontamination. The floors in the Support Structure are poured concrete with various floor coverings including indoor-outdoor carpet, painted concrete, and resilient floor tile.

Because of the time when the building was constructed, the floor tile could have asbestos-containing material (ACM) in it. If carpet was put down over the tile in some areas it could be on ACM.

2.1.4 Ceilings

The ceilings in process areas are usually the underside of the roof or the poured concrete floor above. Ceilings exposed to acid and caustic splashes or fumes are covered with a hi-gloss epoxy finish having excellent resistance and decontamination characteristics. Some office and laboratory areas have suspended ceilings with pre-finished surfaces. The production area control rooms have suspended acoustical panel ceilings. Offices also have suspended acoustical panel ceilings. The process area

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hallway ceilings are not covered and most of them contain electrical conduit, process piping, and miscellaneous building instrumentation.

2.1.5 Roof

A flat decking of reinforced concrete forms the roof of Building 371. (Actually, the roof has a center ridge line running east to west from which it slopes down slightly to the north and south.) The roof has an overlay of tar and gravel.

2.1.6 Doors

Exterior, compartment, and room doors are metal, with metal frames. Doors in fire-barrier walls are rated and labeled in accordance with applicable National Fire Protection Association (NFPA) standards. The doors have fire ratings appropriate to the walls in which they are mounted. Outer radiation-shielding doors for tank vault Rooms 3337, 3559, and 3563 are 2 feet thick. These doors are made of steel, with water-filled cores, and they are opened and closed by hand crank; these doors roll on steel rails.

There are no windows in the exterior walls of the hardened section of the Plutonium Recovery building, Building 371. Inside there are a few windows mostly in airlock doors, control room doors, and control room walls. For radiation shielding, the control room windows are made of leaded glass or they contain water between two layers of glass that are 3/4 to 1 inch thick. The thickness of the windows and the water in the space between them equals the thickness of the walls around them. The outer (process) side of the window glass is bullet proof. Some of the windows have roll-down steel covers for the outer side (the process room side)

The Support Structure does have windows in the hallways, offices, office doors, exterior doors, and the Cafeteria.

2.1.7 Interfaces

There are several different types of process area, glovebox, and Stacker Retriever Vault interface devices in Building 371. These include I/O (Input/Output) Stations, Conveyors, Chainveyors, Liquid Transfer Systems, Sample Conveyor Systems, PuO_2 Transfer Systems, PuF_4 Transfer Systems, NaF Pellets Transfer Systems, and Fulflo Filter Transfer Systems.

I/O Stations are found in the following process rooms and service the designated gloveboxes and are described as follows:

- I/O Station #1 is located in Room 3602, is connected to Airlock AL-#1, and it services Glovebox GB-1. GB-1 contains Chainveyor CV-027 and is connected to GB-2 and GB-3. GB-2 contains Conveyors CV-29A, CV-29-B, and CV-29C. GB-3 contains Chainveyor CV-62. All three gloveboxes are connected to Downdraft Table DT-4 and Downdraft Enclosure, DE-1.

- I/O Station #2 is located in Room 3701, is connected to Airlock AL-#2, and it services Gloveboxes GB-1506, GB-1516, GB-1518, GB-1502, GB-1503, GB-1527 GB-1500A, and GB-1500B, and Downdraft Table, DDT-27.

- I/O Station #3 is located in Room 3515, is connected to Airlock AL-#3, and it services Glovebox GB-32. GB-32 contains a motorized Shuttle Conveyor, CV-11 that runs on four Roller Conveyors, CV-70, CV-71, CV-72, and CV-73 from GB-32 leading to the Reduction Turntable, MD-16T, located in the Reduction Canyon, Room 3531. GB-32 has a small glovebox section on the east side that contains a Residue Counter, ME-16E.

- I/O Station #4 is located in Room 3511, is connected to Airlock AL-#4, and it services Glovebox 33. GB-33 contains a "Green Cake" Boat conveyor, CV-065 and a "Green Cake" Boat Chainveyor, CV-044 that services the entire Precipitation Canyon, Room 3521. GB-33 has four PuO_2 bulk conveyors, CV-88A, CV-88B, CV-88C, and CV-88D for vacuum transfer of the PuO_2 "Green Cake" to the four Fluid Bed Fluorination Reactors located in the Fluorination Canyon, Room 3523.

- I/O Station #5 is located in Room 3305, is connected to Airlock AL-#5A and Airlock AL-#5B, and it allows material movement into and out of Gloveboxes GB-36, GB-37, and GB-38. Airlock AL-#14 connects GB-38 to GB-36. GB-36 contains four Trolley Hoist Conveyors, CV-41A, B, C, D. GB-36 contains Conveyor CV-40. Glovebox GB-75, which is the liquid sampling and transfer glovebox for Tank Vault Room 3303, is located in the west part of Room 3305, contains Sample Transfer Conveyor CV-14G. Glovebox GB-37 contains Conveyor CV-47. Glovebox GB-38 contains Fulflo Filter Conveyor CV-100A.

- I/O Station #6 is located in Room 3206 and is connected to Airlock AL-#6A and Airlock AL-#6B. I/O Station #6 provides material movement service into and out of Gloveboxes GB-45 and GB-391. Glovebox GB-391is connected to GB-390 which has an Airlock, AL-#18. Airlock AL-#13 connects Gloveboxes GB-40 and GB-41. Airlock AL-#11 connects Glovebox GB-43 to GB-40. Airlock AL-#17 connects Glovebox GB-40 to Downdraft Table DT-13 which is located inside Downdraft Entry DE-7 which is located in the adjoining room, Room 3204. Glovebox GB-45 contains Conveyor CV-24; Glovebox GB-41 contains Conveyor CV-25; Glovebox GB-39 contains Overhead Conveyor CV-36; Glovebox GB-40 contains Conveyor CV-37; GB-44 contains Hoist Conveyor CV-38; GB-39 contains Scrap Conveyor CV-39; Glovebox GB-42 contains Cart Conveyor CV-57.

- I/O Station #7 is located in Room 3412, is connected to Airlock AL-#7, provides material movement service into and out of Gloveboxes GB-47 and GB-48A, B, C, and GB-48D. Glovebox GB-48E is an airlock connecting Gloveboxes GB-48D and GB-48F. GB-47 contains Conveyor CV-94. CV-94 provides material movement into and out of Gloveboxes GB-71 and GB-72 located in adjoining Room 3408. Sample Transfer CV-14H to and from Glovebox GB-32 in Room 3515. Sample Transfer CV-14J to and from Glovebox GB-36 in Room 3305.

- I/O Station #8 I/O is located in Room 1111, is connected to Glovebox AL-#8, provides equipment movement service to Gloveboxes GB-22, GB-68, GB-69, GB-70, and GB-74 which are "hot" Maintenance Gloveboxes. Glovebox GB-70 contains Hoist Conveyor CV-66.

2.1.8 Utilities

All of the HVAC and Utilities Systems (with a few minor exceptions) are controllable from the Central Utilities Control Room, Room 2107, of the Building 371/374 Complex Support Facility. Controls on the central control board permit starting and stopping equipment as well as controlling such things as room differential pressure and temperatures. The Building 371 Data Acquisition and Control System (DACS) provides operating information on almost 1000 building utility and HVAC parameters and alarms at the operator's console within the control room. The DACS was upgraded in 1995 to provide broader indications of temperatures, flows, and pressures for various utilities and ventilation systems. Examples of parameters monitored by DACS include, the exhaust plenum temperatures and pressures; CSV oxygen levels; building room temperatures and pressures; Selective Alpha Air Monitor (SAAM) alarms; filter plenum fire alarms; and exhaust stack emissions. The DACS displays data, graphs, alarms, and building system diagrams. Certain critical alarms, in addition to being reported on the DACS, are duplicated on the central control board.

Utility Control Room
The Utility Control Room is within a "hardened" portion of the Support Facility. In this location the effects of earthquakes and tornadoes are minimized and protection from incidents or problems originating in the process areas of Buildings 371 or 374 is maximized. Supporting equipment such as the DACS computer, backup power supply, signal multiplexers, and relay panels are in the same protected area. HVAC System 4 under both normal and emergency power conditions provides filtered, conditioned air to the control room. An uninteruptible power supply provides a continuous source of power for the DACS computer, the central control board, and all instruments and controls powered from this board.

Electrical Systems
There are three main electrical systems in the Building 371/374 Complex, which are comprised of: 1) normal power (i.e., Public Service Company service); 2) turbine generator (TGEN; alternate to Public Service Company power); and 3) Uninterruptable Power Supply (UPS) System (battery power). Public Service Company of Colorado supplies electricity at 115 kV to the site ring bus. The site ring bus receives power from two transmission lines, and a third line is available as backup if necessary. Substations 517 and 518 reduce this to 13.8 kV and supply site power to the Building 371/374 Complex. A turbine-driven generator in Room 3583 of Building 371 provides standby power. The UPS System supplies selected electrical equipment with continuous power from battery backup in the event that offsite and TGEN power is interrupted. The UPS System supplies power to the Life Safety/Disaster Warning (LS/DW) System, utilities control board, DACS control console, Continuous Air Monitor

(CAM) panel, effluent CAM air blowers, HVAC isolation valves, and the HVAC System 1 and 2 indication.

Under normal operating conditions, the Building 371/374 Complex is powered by two feeds from the site Electrical Power Distribution System. Offsite power is delivered at 115 kV ac. It arrives at a switchgear substation on the north side of the site (configured as a ring bus) where automatic switchgear selects one or both of the two Public Service Company of Colorado 115 kV ac transmission lines (Ralston line or Eldorado line), as the site supply. A third line (Plainview line) is available as a manual backup if necessary. Two 115 kV ac lines deliver power from the load side of the ring bus to Substations 517 and 518 via Primary Switches 9135 and 9136, A and B. Public Service Company of Colorado retains control and maintenance of all of the 115 kV distribution, including the feeder lines (designated "east" and "west") up to the fuses feeding the 517 and 518 substations.

Substations 517 and 518 are composed of two transformers, which step the 115 kV down to 13.8 kV for primary distribution to the Building 371/374 transformers and switchgear. Two independent 13.8 kV lines transport power to the building transformers. The substation also has an automatic tiebreaker that allows for transfer of power from the main breaker of one transformer to the feeder breakers of the other transformer. Substations 517 and 518 feed six transformers that supply power to Building 371, Building 374, and other auxiliary facilities. Other onsite substations can also supply power to the Building 371/374 transformers by reconfiguration of various line switches. The 13.8 kV ac is stepped down to 2400 V and 480 V ac by the building transformers and distributed via their respective switchgear to the electrical loads.

There are two classifications of electrical distribution equipment, normal and those having the capability of being fed from the TGEN. The normal busses distribute power supplied by building SwitchGear (SWGR) 371-1/2 and SWGR 371-3/4 to their respective loads. The busses, designated with the prefix "E," are part of the Electrical Power Distribution System but can also receive backup power from the Emergency Generator (EGEN-1), in the event that normal power is lost. The busses are normally fed by Emergency SwitchGear (ESWGR) 371-5/6.

The Electrical Power Distribution System in Buildings 371 and 374 includes the following:

- Transformers 371-1 and 371-2 and 480 V Switchgear: Transformers 371-1 and 371-2 step down the line voltage from 13.8 kV to 480 V and provide power to SWGR 371-1 and 371-2. SWGR 371-1 and 371-2 provide electrical power to Buildings 371 and 374 nonessential loads via motor control centers
- Transformers 371-3 and 371-4 step down the line voltage from 13.8 kV to 480 V and provide power to SWGR 371-3 and 371-4. SWGR 371-3 and 371-4 provide electrical power to Building 371 nonessential loads via motor control centers.
- Transformers 371-5 and 371-6 and 2400 V Switchgear: Transformers 371-5 and 371-6 step down the line voltage from 13.8 kV to 2400 V and provide power ESWGR 371-5 and 371-6. ESWGR 371-5 and 371-6 provide 2400 V electrical

power distribution to safety equipment in Buildings 371 and 374. ESWGR 371-5 and 371-6 also supply power to ESWGR 371-7 and 371-8 via 2400 V/480 V step-down Transformers 371-7 and 371-8 (see below).

- Transformers 371-7 and 371-8 and 480 V Switchgear: Transformers 371-7 and 371-8 step down line voltage from 2400 V to 480 V and supply power from 2400 V ESWGR 371-5 and ESWGR 371-6 to 480 V ESWGR 371-7 and ESWGR 371-8. ESWGR 371-7 and 371-8 provide 480 V electrical power to safety equipment in Buildings 371 and 374 loads via motor control centers.

Turbine Powered Generator System (TGEN)

Turbine Powered Generator System (TGEN) provides standby power to the electrical system. A Fuel Oil Supply System, Diesel Starting System, a Lube Oil System, and batteries powering controls and fuel pumps support the turbine. The system consists of the following major components:

- Gas turbine (driver and clutch)
- Electrical generator
- Controls and logic (breaker, control circuits, etc.)
- Lube Oil System (filters, oil pumps, air-to-air cooler, bypass temperature control)
- 24 V battery supply (power to Turbine Control System)
- 125 V battery supply (power to fuel pump, lube oil pump, generator circuit breaker, and the Generator Control System)
- Diesel engine starter (air start auxiliary, instrument air supply connection with high-pressure air cylinder backup, and auxiliary air storage tank)

The TGEN is a 2400 V, three phase, 2.5 MW turbine-driven generator in Building 371, Room 3583. It is normally inactive (on automatic standby) as long as either or both of the normal power sources to the building are energized. Compressed air is used to start a diesel engine, which in turn starts the turbine. Once the TGEN is feeding power to the equipment, it remains on until the load is manually transferred back to normal power. When normal power again becomes available, the restoration is made by manually opening the standby power disconnect to ESWGR 371-5/6 and closing the normal power disconnects to ESWGR 371-5/6.

The TGEN has a day tank with an 11-hr fuel supply. Number 2 fuel oil is provided from the shared fuel oil supply. The diesel engine air starter uses a minimum of 60-psi compressed air that is obtained from the Instrument Air System. There are also nitrogen high-pressure cylinders provided for backup. In addition, there is a 40-gal air storage tank capable of two normal starts without any make-up air from the instrument air supply or the high-pressure cylinders.

Fuel Oil Supply System

The Fuel Oil Supply System consists of an above ground storage tank, Tank D-262A (tank renumbered Tank D-4?), with a capacity of 6,000 gal. The tank is just west of the

TGEN room. An emergency connection to the day tank is provided manually adding fuel in the event the pumping system is out of service.

Uninterruptable Power System (UPS) System

The UPS System in the Building 371/374 Complex consists of two active subsystems, UPS-371C in Room 2121 and UPS-371E in Room 2101. Each system contains a power charger, storage batteries, an inverter, and an alternate feed transformer. The battery charger and alternate feed transformer for each subsystem are powered from the 480 V ac standby power circuit. The UPS Systems provide 120/208 V ac power to their respective loads for 30 minutes to support achieving a safe facility configuration and to assist in emergency responses. The UPS-371C primarily supports monitoring of S/R material in transit and memory of the task following a loss of power. The UPS-371E primarily supports monitoring of the facility, maintaining some alarm and response functions, and operating some vital equipment. Following a power loss, the UPS-371E also supplies power to the LS/DW System equipment that permits timely broadcast announcements to be made concerning facility evacuations (e.g., announcing the need to evacuate, the safest evacuation routes, and the location and type of potential hazards. Loads from each subsystem, partially include the following:

- UPS-371C: S/R computer and S/R monitor cameras
- UPS-371E: Utility Control Room central control board (HVAC monitoring), utility DACS control console, air compressor master control panel, CWTS GB Photohelics and dump valves, CAM alarms, Local Area Network (LAN), HVAC System 1 & 2 isolation valves and indication, ventilation fans in UPS-371E Room, CAM air blowers, SAAMs alarm panel, and LS/DW System equipment

Emergency Lighting

Emergency lighting is provided throughout Buildings 371 and 374 to allow emergency egress. The system includes emergency lights and power to emergency exit signs. Emergency lighting is provided with internal battery power within designated lighting fixtures. The existing Emergency Lighting System is composed of a combination of fluorescent and incandescent emergency light sources, emergency exit signs (light-emitting diodes), and emergency power junction boxes. The Emergency Lighting System has been upgraded to meet the minimum functional requirements of the National Fire Protection Association (NFPA). The upgrades provided battery-powered incandescent lamps, seismically mounted as required to provide necessary illumination for egress.

Grounding and Lightning Protection

The grounding and lightning protection systems provide a path to ground for electrical faults and atmospheric discharge currents, thus preventing severe electrical shock to personnel, damage to equipment and structures, and fires. The grounding and lightning protection systems for Building 371 and the Support Facility were installed in accordance with the NFPA and Underwriter's Laboratory

The lightning protection for Building 371 consists of aluminum air terminals uniformly spaced along the periphery of the roof, across open roof areas, and on roof-mounted

equipment that is susceptible to lightning strikes. Protected equipment includes metal ventilation ducts, filter plenum enclosures, and exhaust stacks. Air terminals along the periphery cannot provide adequate protection for objects above the roofline; therefore, additional air terminals are mounted in this area. Aluminum conductors uniformly spaced about the building periphery electrically interconnect the air terminals, aluminum parapet flashing, downspouts, and other metal objects to the grounding system. Downspouts are connected to copper grounding wires 2 ft above grade. Fused copper-to-aluminum connectors, designed to prevent electrolysis and corrosion, interconnect the grounding system. The lightning protection ground is isolated from both the building electrical grounding system and the sensitive equipment grounding system. It consists of ground wells spaced around the periphery of the building, each well containing a copper-clad steel rod extending 10 ft below grade. Copper wires running from the rods to the building walls are buried 1.5 ft below grade. The wires extend approximately 2 ft above grade at the building walls, where they connect to downspouts and conductors from the lightning protection system. The building electrical grounding system offers a path to ground for electrical fault currents (short circuits) and supplements the protection offered by fuses and circuit breakers to the normal electrical equipment in the building. The grounding system also "bleeds off" static electrical charges from equipment that could cause shock or fire. Metal electrical equipment enclosures are tied to this system to prevent possible shock to personnel if a short circuit occurs within the equipment enclosure. The grounding system consists of a grid of copper wire along the reinforcement bars of the concrete floors, walls, and columns of the building. The grid has a very low electrical resistance to ground because it ties into the reinforcement bars in the building piles that extend approximately 50 ft below grade. There are grounding plates attached to the grid at various locations in the concrete floors, walls, and columns of the building for connection to electrical equipment.

Fire Suppression Systems

The Fire Suppression Systems consists of fire water supply, risers, distribution piping, and automatic sprinklers, a Halon System, CO_2 System, fire extinguishers, and the Filter Plenum Deluge System. Each system discussed in detail below is generally installed in accordance with NFPA requirements.

Fire Water Supply or fire suppression water is supplied to the facility from the site Domestic Water Supply (DWS) System. The DWS System is a 10-in. pipe that loops around the Building 371/374 Complex. Water can be supplied in either of two directions using sectional control valves, ensuring capability for continuous service in the event of a line break. The DWS System provides water to Buildings 371 and 374 risers and to 10 fire hydrants around Buildings 371 and 374.

Building 371 has three Fire Suppression Risers, 8-in. risers, (designated as Risers 371-A, 371-B, and 371-C), that supply water from the DWS System to the distribution piping. A 4-in. line interconnects riser 371-B and Riser 371-C. There is no interconnection to Riser 371-A. Areas supplied by each riser include the following:

- Riser 371-A in Room 3154 provides water to the ground floor, office areas, cafeteria, east maintenance dock, south cafeteria dock, basement, and other portions of the support facility without radiological material areas.
- Riser 371-B in Room 3585 provides water to the subbasement, the Filter Plenum Deluge System, TGEN room, and northwest section of the ground floor.
- Riser 371-C in Stairwell #1 provides water to the subbasement south of the CSV, the plenum deluge system, and part of the ground floor.

The areas without sprinklers include rooms with electrical panels and vaults.

Manual Fire Suppression Capability
Hose stations provide backup manual fire suppression capability to most areas of Building 371. Exceptions are areas that are not normally accessible, such as the CSV. Suppression water is supplied from Risers A, B, and C. Major components of the Hose Stations System include the fire hose stations (hose connections only), piping, and valves.

Carbon Dioxide (CO_2) Fire Suppression System
The Carbon Dioxide (CO_2) Fire Suppression System provides fire suppression capability to the TGEN enclosure in Room 3583. Major components of this suppression system include the CO_2 storage unit and controls. The system is supplied by five 100-lb primary cylinders and five 100-lb reserve cylinders and actuated by heat detectors mounted inside the generator enclosure designed to activate at 325°F. The CO_2 System is actuated when the generator enclosure temperature reaches or exceeds the design temperature of the detector and a signal is sent to a CO_2 control panel and relayed to the suppression device. Two manual pull stations inside Room 3583 may also activate the system.

Halon Suppression System
The subfloors of the Stacker/Retriever (S/R) computer room, Room 2128, are protected by the Halon Suppression System. The system is provided with one 30-lb primary cylinder and one 30-lb reserve cylinder of Halon and is designed to achieve a 5% Halon concentration during suppression of a fire. The system is automatically activated by activation of two independent ionization smoke detectors. Before actually actuating (i.e., on activation of only one smoke detector), the system provides a 30 sec audible warning alarm as a life safety feature. During actuation the room air conditioner is isolated, the computer shuts off, and Halon floods the areas under the computer floor. Manual release and abort switches for the system are also available. Horns also sound when the Halon agent is releasing. A sitewide program is in place to minimize reliance on Halon Systems due to environmental concerns.

Portable fire extinguishers are currently located throughout the buildings. These include class A, B, and C extinguishers compliant to NFPA requirements.

Filter Plenum Deluge Systems
The Filter Plenum Deluge Systems are designed to protect the HVAC Systems 1, 2, and 3 exhaust HEPA filters in the event of a fire. High temperature flows are diverted from

the filter the HEPA filters in HVAC System 9 (the inert HVAC), thus protecting the filters from being exposed to temperatures beyond designed safe operating conditions. The Filter Plenum Deluge System has two primary system functions. The Zone I and Zone IA Plenum Deluge System, with back up tank water supply, meets the Evaluation Basis Earthquake (EBE) criteria.

The first system function, plenum spray, is actuated automatically when detecting high temperatures (setpoint at 190°F) in the inlet duct to the filter plenum. The deluge system sprays water through a nozzle, which breaks up the liquid streams (e.g., atomization) into the air stream to cool hot gases entering the plenum, to aid removal of particulates from the air and to help extinguish glowing embers that might otherwise damage the HEPA filters. A demister screen in the plenum ensures removal of larger particulates (e.g., water, and embers) from the air stream before they reach the HEPA filters thereby preventing filter blockage and mechanical overload (excessive pressure drop). A valve is installed to allow manual operation of the deluge system.

The second system function consists of a manually operated bypass line installed to spray suppression water directly on the first stage HEPA filters. Less emphasis is placed on this backup function as the HEPA filter media now utilize flame resistant material and should not require direct spray for their protection. The deluge system equipment is on the basement level of the building.

Water is supplied to the plenum deluge system from Risers 371-B, 371-C, and 374-A. The deluge systems are adjacent to and within the HVAC plenums on the basement level. Only the Zone I and IA plenums have a backup tank water supply in addition to the risers. The tanks are D-710 (Room 2307) for System 1 and D-711 (Room 2202) for System 2. If the normal water supply pressure from the risers drops below a specified setpoint, the outlet valve on the backup tank automatically opens and supplies suppression water to the spray nozzles if an actuation of the deluge system occurs. The tanks are designed to provide approximately 30 min of suppression water flow. The spray nozzles and their associated flow control equipment are designed to ensure an appropriate spray configuration for all systems.

Fire Detection System Alarm System
The Fire Detection System Alarm System consists of sprinkler flow detection, Halon System smoke detector activation indication, CO_2 System discharge detection, smoke detection, heat detection, GB overheat detection, and fire phones. Each System discussed below is generally installed in accordance with NFPA requirements.

2.1.9 Heating, Ventilation and Air Conditioning

The Building 371/374 utilities for heating, ventilating, and air conditioning (HVAC) contains nine HVAC Systems. These systems were designed to provide the following capabilities:

- Furnish air conditioned for personnel comfort
- Provide air suitable for process operations

- Provide for confinement of Pu within the controlled areas
- Prevent the dispersion of hazardous aerosols, noxious fumes, and vapors into areas normally occupied by personnel
- Prevent the release of radioactive aerosols from the building
- Control the release of noxious fumes and vapors from the building

The ventilation systems provide five zones of different relative pressures as appropriate to provide assurance that contamination will not migrate to less contaminated areas. The zones are as follows:

- Zone I provides the ventilation for the primary confinement where highly radioactive material is handled. Zone I (and Zone IA) is maintained at the lowest pressure, or greatest Differential Pressure (DP), for GBs, process canyons, and conveyer enclosures in Building 371. Zone I exhaust ventilation is filtered and discharged from the facility.
- Zone IA provides the ventilation for the primary confinement in vaults and open enclosures (hoods and downdraft tables), which are in direct contact with radioactive or hazardous materials. Zone IA exhaust ventilation is filtered and discharged from the facility.
- Zone II provides the ventilation supply and exhaust for the secondary confinement in the building by establishing an intermediate DP and ensuring filtration of air, which is normally recirculated within the facility. Zone II includes any areas containing Zone I or Zone IA equipment, or otherwise communicating with these areas (e.g., adjacent area outside boundary).
- Zone III provides the ventilation for the tertiary confinement in the building. Normally Zone III areas are not contaminated and their exhaust recirculated. Zone III areas do not directly communicate with Zone I or Zone IA areas. The only exceptions are the Zone I and Zone IA ventilation in Room 3042. However, Room 3517 and Room 3571 have functions that could be appropriately handled by Zone II Ventilation.
- Zone IV provides ventilation for office areas and other uncontaminated areas.

The ventilation systems are listed with the applicable facility area serviced in Table 2-1:

Table 2-1 HVAC System Identification

System	Building	Area
HVAC System 1	371	North process
HVAC System 2	371	South process
HVAC System 3	374/Support Facility	Waste Treatment
HVAC System 4	Support Facility	Utilities
HVAC System 5	Support Facility	Office areas
HVAC System 6	371	Switchgear and generator
HVAC System 7	381	Previously, fluorine building
HVAC System 8	373	Cooling tower pump house
Inert Ventilation System	371	CSV, Associated areas, reduction canyon, & inert GBs

HVAC System 1 and HVAC System 2

HVAC System 1 services the north half of Building 371 and HVAC System 2 services the south half. Each system has a very similar design and capacity. HVAC Systems 1 and 2 provide confinement through both airflow path and filtration, and conditioned air for zones I, IA, II, and III in Building 371. The Supply Air Units (SAUs) deliver a mixture of outside air and air recirculated from Zones II and III to Zones I, IA, II, and II areas. The Zone I and Zone IA exhaust filters filter the exhaust air from Zone I and Zone IA rooms, GBs, and hoods through four stages of HEPA filters before the entire quantity of exhaust air is exhausted to atmosphere. The Zone II and Zone III exhaust filters filter the exhaust air from Zone II and Zone III areas through two stages of HEPA filters before a portion of the air is recirculated to the Zone II and III areas and the rest is returned to the SAUs.

HVAC Systems 1 and 2 provide differential pressure (DP) control, (ventilation flow path), and filtration functions intended to limit any contamination spread and mitigate potential releases. Portions of these systems (i.e. Zone I and Zone IA) also provide confinement functions. Air quality requirements include oxygen levels for workers (air circulation to prelude low oxygen concentrations), particulate removal (e.g., dust or radionuclide contamination), and temperature control. Heat sources within the facility include heat from decay of Special Nuclear Material (SNM), equipment (e.g., fans and pumps), and personnel. Heat is removed seasonally by exhausting warm air from the facility and by cooling inlet and recirculated air. HVAC System heat is rejected to the cooling tower

While Zone I and Zone IA portions of the ventilation system serving the areas of greatest expected contamination potential operate as once-through (i.e., their exhaust is discharged from the facility), the Zone II and Zone III air is normally filtered and recirculated within the building. In the infrequently used system-dump mode, the bypass dampers are realigned such that about half (System 1) or all (System 2) of Zone II exhaust is discharged from the building. The system-dump capability is provided to maintain a more habitable interior environment in an accident such as a significant fire and is also used during normal operations to remove nontoxic fumes and odors from the areas (e.g., paint fumes). Outside air entering the building is conditioned for habitability and drawn through a single stage HEPA filter bank.

HVAC System 3

HVAC System 3, which provides conditioned air, and confinement functions for Building 374 and the Support Facility, will be described in the Building 374 section of this report.

HVAC System 4

HVAC System 4 is designed to provide conditioned air to the Support Facility with the exception of areas storing or maintaining SNM, and areas served by HVAC System 5. Air quality requirements include oxygen levels for workers, dust removal, and temperature. Areas served include the Utilities Control Room (Room 2107), the chemical preparation area on the mezzanine level of the Support Facility, and the basement of the Support Facility. The system consists of the following major components:

- The OAU (Outside Air Unit) supplies fresh outside air to the Support Facility to replace air exhausted from the facility. The OAU conditions inlet air by filtering and preheating the air. The OAU includes an inlet louver, a preheat coil, and a prefilter. The OAU is connected by ducts to the supply air portion of the HVAC System.
- SAU and fan receives air from the OAU and distributes to the required areas by a single SAU (SAU-404) and a supply fan. The SAU receives air from the OAU and air recirculated from within the facility (i.e., nonducted return air). The SAU filters and cools the air prior to distribution.
- Exhaust air plenum and fan exhaust air from the facility by a single exhaust fan, through dampers and an exhaust stack. The exhaust air is not filtered prior to discharge.

HVAC System 5
HVAC System 5 provides heating and ventilation to the south side of Building 371 Office Area (ground floor). This area of the facility houses the 3100 series of rooms, including the cafeteria (Room 3138); personnel offices; a welding, sheet metal, and pipe shop (Room 3148); and a paint shop (Room 3160). All the 3100 series of rooms are serviced by the HVAC System 5, except for Rooms 3162, 3164, 3166, 3181, 3185, 3187 and 3189. No radioactive materials are handled in the HVAC System 5 service area.

HVAC System 6
HVAC System 6 provides heating, cooling, and ventilation to the switchgear and TGEN rooms (Room 3581 and Room 3583). Major system components include the following:

- Room 3583 (Turbine Generator, or TGEN) air intake with tornado missile barrier, backdraft damper, and fire damper
- Room 3581 backdraft damper
- HVAC ducts and valves
- Heating and ventilation unit (HV-501)
- Unit heater (steam supplied)

HVAC System 7
HVAC System 7 is described in Section 2.9.1, which describes Building 381, the fluorine supply building for Building 371.

HVAC System 8
HVAC System 8 services the Cooling Tower Pump House, Building 373. The system in intended only to prevent the Pump House from becoming too hot or freezing and is not design to provide human comfort. Major system components include the following:

- Steam heating and cooling coils,
- Filters,
- Outside and return air mixing dampers, and
- Two-speed centrifugal supply fan.

Inert Ventilation System

The Inert Ventilation System provides cooling and confinement functions for the Central Storage Vault (CSV, Room 1206, aka Stacker Retriever), inerted Gloveboxes, and I/O Stations. The areas serviced by this system may be operated with inert (nitrogen) or air atmosphere. The system is designed to help maintain the quality of the atmosphere prior to recirculation, thus reducing airborne contamination levels. In addition, it provides for heat removal from the CSV and reduces the potential for fires. The system consists of two parallel, 2-stage HEPA filters (FP-125A and FP-125B), four recirculation fans, ducts, dampers, and cooling coils. Heat is rejected from the cooling coils to the Process Chilled Water System. There are two separate cooling and recirculating subsystems in the Inert Ventilating System. The largest subsystem provides inert atmosphere to the CSV, the Stacker Retriever Repair Bay, and a number of I/O stations. The second and smaller subsystem services the inert gloveboxes and the reduction canyon, Room 3531. Although the flows of nitrogen for the subsystems are separately cooled and circulated, the return flows are normally combined for filtration through one of the two HEPA filter plenums (FP-125A or FP-125B). Two stages of HEPA filters are installed in each filter plenum to remove particulate contaminants.

The inert atmosphere in each subsystem is circulated by centrifugal fans, B-50A and B-50B for the vault subsystem, and B-51A and B-51B for the inerted canyon and glovebox subsystem. Centrifugal fans B-50A and B-50B normally operate together, but each can handle its subsystem separately. One of the canyon/glovebox subsystems fans, B-51A or B-51B is normally operating while the other is in standby. Each subsystem is cooled with a duct-mounted cooling coil and its associated water-cooled condenser.

The two subsystems can be operated independently or dependently. If they are being operated independently, either plenum can be purged with room air so that maintenance work can be performed while the total nitrogen flow is recirculated through the other. If they are being operated dependently, F-125A is considered the operating plenum and FP-125B is considered the standby plenum.

Conditioned nitrogen is supplied to and returned from the operating spaces by a system of ducts and dampers. Automatically controlled butterfly valves were installed in the ducts to maintain the required DP. Negative DP is maintained by bleed off to HVAC System 2 exhaust filter plenum FP-242. Over pressurization of nitrogen inerted systems is prevented by automatically shutting of nitrogen supply valves, Valves 5649-2, 5649-7, 5631, and Valve 5692, on high DP. Makeup nitrogen is provided by the Site Nitrogen Plant.

The Building 371 main floor is divided into six separate compartments as follows:

1. The northwest compartment contains equipment for aqueous and pyrochemical plutonium recovery processes. This compartment was originally divided into two modules (north and south). The north module is further divided into two canyons, one vault, and nine other rooms. This area, the designated americium process area, was never used as such, but three of the areas were converted to storage vaults for

drums and Special Nuclear Material (SNM). The south module is further divided into four rooms.

2. The southwest compartment is divided into two vaults, a control room, and an area for processing site returns. Site returns were nuclear weapons returned to the Site for upgrade or retirement. Presently this process area is being used for Residue Sampling and Wet Repack.

3. The north central compartment contains equipment for aqueous recovery operations and storage areas for plutonium oxides and residues from aqueous recovery operations. This compartment is divided into two modules (north and south), and three other rooms. The north module is further divided into two vaults, two canyons, and twelve other rooms. The south module is further divided into four canyons, and nine other rooms.

4. The south-central compartment is divided into thirteen rooms, which include analytical, and standards laboratories, the health sciences group, and decontamination areas. The east room, Room 3420,is a backlog barrel storage area with a Tomographic Gamma Scanner System (TGS).

5. The northeast compartment was originally divided into three canyons, and four other rooms. Two of the canyons housed incinerators; the third canyon housed a scrubber system for the incinerators. The rooms originally housed residue loading and unloading operations, and control operations for the canyons. Presently the north half of this area is under construction for the new Pu Stabilization and Packaging System (PuSPS). The east part of Room 3701 presently is being used as a drum storage area.

6. The southeast compartment is divided into two rooms. The east room, Room 3606, is a high-bay drum storage area for residues with high levels of radioactivity. The west room, Room 3602 was used for shipping and receiving of plutonium and plutonium-containing materials. Presently Room 3602 is being used as the salts and sand, slag and crucible (SS&C) sampling and repackaging area.

2.2 Description of Building 371 Operations

Building 371 was designed for use of automatically controlled, remotely operated processes. Design features included the use of remotely operated transfer systems for movement of radioactive materials. The stacker-retriever, a computer-operated and rail-mounted shuttle, moved radioactive material between storage and plutonium recovery operations.

The plutonium handling areas of the building are compartmentalized by firewalls, airlocks, and the use of negative air pressure, to prevent the spread of plutonium from one to another. The compartments are further divided into rooms, canyons, and vaults. Rooms were used to house glovebox operations and equipment that did not require

special containment precautions. Process equipment within the canyon was remotely operated; the canyon and all the equipment inside were contaminated with plutonium.

Vaults are essentially storage areas that are designed to prevent criticality of stored plutonium-containing materials. To prevent nuclear criticality, storage racks hold containers in a safe geometry, and tanks and containers within the vaults are of a safe geometry, or are filled with boron-glass Raschig rings. Tanks in certain areas are located behind 2' concrete walls, which would help to shield personnel from radiation in the unlikely event of a nuclear criticality. The plutonium processing areas of the ground floor are divided by hallways into six compartments. The compartments are constructed of noncombustible materials, and have at least a two-hour fire rating to prevent the spread of fire, and to limit potential contamination from a fire to a single area. Each of the compartments is further subdivided into modules or rooms, and within the modules or rooms, the plutonium processing equipment is contained in gloveboxes, canyons, or vaults. The purpose of these enclosures within enclosures was to contain particulate radioactive material and shield operating personnel from radiation.

2.2.1 Historical Processes

Historical Incineration Processes
Building 371 originally had two incinerators and their afterburners, located in separate concrete canyons that were designed to burn most of the combustible wastes generated by the plutonium recovery operations. One was located in Room 3713 for high specific activity waste, and the other was located in Room 3715 for low specific activity waste. Due to the size and shape of the incinerators, they spanned multiple levels of Building 371 (basement to attic). These two incinerators were stripped out approximately ten years ago to make way for the installation of the Plutonium Recovery Operations Verification Exercise (PROVE) gloveboxes and plutonium processing equipment. The PROVE area is currently under construction to install the Pu Stabilization and Packaging System (PuSPS).

Operations in Building 371 focused on the recovery of plutonium from Plant activities (nuclear weapons parts fabrication, component assembly and research and development activities). Americium, a decay by-product of plutonium, was separated from plutonium and recovered for resale (this process activity never was operational in Building 371).

Other operations included material transfer, waste incineration (radioactive wastes were never incinerated in Building 371, only simulated combustible wastes were incinerated), and laboratory support.

Pyrochemical Processing
Plutonium recovery operations used two different systems to separate high-purity plutonium metal from production-generated wastes. Pyrochemical processing used furnaces and molten salts to separate high-purity plutonium in a dry process. Pyrochemical processing was very efficient, but could not be used with all types of

plutonium bearing materials. Aqueous processing used a series of wet and dry chemical steps to separate high-purity plutonium from production generated wastes.

Materials entering the plutonium recovery process were received as pieces of impure plutonium metal, plutonium oxide, various compounds containing plutonium, and plutonium-contaminated residues. The plutonium content of these materials ranged from a few percent to almost pure plutonium metal. The recovery processes reduced the plutonium and americium content of the residues to levels below the economic discard limits.

Pyrochemical Plutonium Recovery or pyrochemical processing was performed in Rooms 3305, 3303 (tank vault), 3301, and 3315 of Building 371. The major process glovebox was Glovebox GB-36 for the pyrochemical process in Room 3305. Pyrochemical processing began in 1981 and ceased in 1988. Metal plutonium was processed through a pyrochemical operation in which americium was extracted from the plutonium by direct contact with molten salts, yielding a plutonium button low in americium. If other impurities had to be removed, the extracted metal went to an electro-refining process where the plutonium was transformed by electrolysis in a molten-salt bath to an impure plutonium heel, contaminated salt, and product metal of very high purity. Impure metal was burned, converting it to an oxide, and processed through the aqueous chemical recovery systems. The high-purity plutonium button was transferred to the Building 707 foundry operations for casting and weapon component fabrication. Contaminated salts were transferred to Building 771 for americium separation and plutonium recovery.

Dicesium Hexachloroplutonate (DCHP) Preparation
DCHP preparation took place in Glovebox GB-37, Room 3305 of Building 371, for the purpose of converting plutonium oxide to reagent salt DCHP. The DCHP was used as the oxidant in the pyrochemical MSE recovery process in Building 776 for the extraction of americium from site-return metal. DCHP production in Building 371 began in 1989 using non-specification grade plutonium oxide as the source of plutonium feed material and ceased operation in 1990.

The DCHP preparation process involved two major steps: (1) oxide dissolution and (2) precipitation and drying. The oxide dissolution step involved dissolving plutonium oxide in hydrochloric acid and calcium fluoride. The resulting slurry was then filtered, separating the undissolved solids from the solution. The precipitation dry step mixed the filtrate with cesium chloride in hydrochloric acid and sodium nitrate to precipitate DCHP, which was the reagent used in the Building 776 plutonium recovery operations. The DCHP was removed from the solution by filtration and dried in an oven, or muffle furnace, before transfer to Building 776 for use and/or to Room 3305 in Building 371 for storage.

The process contained a system for treatment of off-gases vented from the various reaction vessels. Oxide dissolution filtration off-gas, DCHP filtration off-gas, and muffle furnace off-gas were all initially routed into a trap flask. The off-gases were then passed into a caustic flask where potassium hydroxide was added and the gasses were

eventually discharged through a vacuum pump and treated in the caustic treatment process. The undissolved plutonium oxide solids from the oxide dissolution step were either recycled through dissolution and/or removed from the glovebox for storage.

Aqueous Plutonium Recovery

Aqueous Plutonium Recovery used plutonium oxide and other materials as feed material and required a series of wet and dry chemical processing steps to produce a plutonium button of high purity. As a first step, the oxide and other materials were dissolved in nitric acid in a series of cascade dissolution pots. The plutonium-containing acid solutions from the dissolution processes were adjusted for normality (7.5N H+) with nitric acid or water and ferrous sulfamate (for Pu valence adjustment) into an adjusted nitric acid feed. This adjusted Pu nitrate feed solution was then pumped through anion exchange columns. The anion exchange resin selectively absorbed plutonium ions while allowing certain other metallic ions (iron, chrome, nickel, etc.) to pass through. Americium formed a weak bond with the resin, allowing selective segregation of the americium from the plutonium. Solutions high in americium were segregated for further processing in americium recovery, and the remainder went through a secondary recovery process.

The loaded anion exchange resin columns were then washed with 7N nitric to remove the metallic impurities, eluted with 0.35N nitric, and the product Pu nitrate solution was collected in clean product eluate tanks. The anion exchange eluate was concentrated in an evaporator. The evaporator concentrate was then fed into a line of precipitation vessels where the plutonium was precipitated as plutonium peroxide. The precipitate was filtered and the filtrate was recycled through anion exchange. The precipitate was transferred to calcining furnaces where the plutonium peroxide was converted to plutonium oxide by heating.

Direct Fluorination Process

The dry plutonium oxide was pneumatically transported to a fluidized-bed reactor in Room 3523, the direct fluorination process canyon, The plutonium oxide was contacted with a fluorine-argon gas mixture to keep it fluidized while converting it to plutonium tetrafluoride (PuF_4), When the reaction was complete, the plutonium tetrafluoride was transported to a receiving vessel in Room 3515, the reduction canyon.

Metal Reduction Process

The plutonium tetrafluoride reduction to plutonium metal was performed in the Reduction Canyon, Room 3531. Calcium metal was measured into reduction vessels, and the plutonium tetrafluoride was added. The reduction vessel was sealed in an induction furnace, evacuated, and purged with argon gas to remove the oxygen. The reduction charge was then heated to initiate a reduction reaction that yielded a pure plutonium metal button and calcium fluoride slag. The plutonium button was sampled, stamped, and shipped as product. The calcium fluoride slag was recycled as cascade dissolver feed.

Nitric Acid Recovery Process

The nitric acid recovery process was performed in Rooms 3573, 3571, and 3517. The system consisted of tanks, gloveboxes, evaporator, and distillation columns that were used to purify the large quantity of nitric acid used in the metal recovery process. The system experienced significant equipment problems. One of the problems associated with the system was that it over-purified the acid above reagent grade. The pure nitric acid interfered with proper functioning of equipment in Building 371.

Plutonium Analytical Laboratories

There are four Plutonium Analytical Laboratories in the Building 371/374 Complex to support environmental, safeguards, and other regulatory requirements. They include the liquids laboratory, standards laboratory, analytical laboratory, and liquid waste sampling laboratory and are in Rooms 3179, 3408, 3412, and Room 3805 respectively. The liquids and the analytical laboratories are out of service. Building 371 housed plutonium analytical laboratories and a chemical standards laboratory, which supported operations throughout the Plant. The plutonium analytical laboratories served Buildings 371 and 374 and acted as a backup for the Building 771 analytical laboratory. The majority of the work at this laboratory consisted of total alpha and beta counts along with radiochemical analyses for specific isotopes in liquid and solid samples. These analyses served as a screening process to identify highly radioactive samples which were unsuitable for detailed analyses in Building 881.

The Chemical Standards Laboratory, Room 3408, in Building 371 prepared both non-destructive assay and destructive assay standards for various user groups at the Plant and inspected standards used in the field. Most laboratory operations took place in gloveboxes. Non-destructive assay standards were prepared for plutonium, americium, and uranium oxides and metals (including beryllium) for a wide range of instrumentation.

Building 371 Caustic Waste Treatment System (CWTS)

The CWTS processed (and still does as generated) both high and low level Pu solutions from tank and pipe draining operations both from Building 371 and Building 771. The CWTS process provides for the collection, sampling, filtration, and disposal of miscellaneous caustic and acidic plutonium-contaminated solutions to waste treatment that meets the Building 374 acceptance of 4.0×10^{-3} grams/liter Pu + U235, and 1.0×10^{-3} grams/liter Am. The CWTS process provides for the treatment of RCRA-regulated hazardous waste and aqueous waste streams. The equipment for CWTS is located in the sub-basement of Building 371 in Rooms 1103, 1105, 1113 and Room 1115. The processing is performed in gloveboxes and tanks within these rooms. The CWTS process uses magnesium hydroxide powder to precipitate Pu, U, Am and other metal impurities. The CWTS process generates three products. One is the basic filtrate solution, which meets the shipping requirements of caustic waste to Building 374. The second product of CWTS is a low level dried filter sludge, item description code (IDC) IDC 054, which is expected to be discardable, with the required approvals. The third product of CWTS is the product from high level solutions is IDC 054H, which is high-level dried filter sludge, which requires further processing in PuSPS.

Shipping, Receiving, Storing, and Retrieving of SNM
The shipping, receiving, storing, and retrieving of SNM occurred daily in Building 371 operations. The receiving and shipping of onsite and offsite waste, residue and SNM occurred from Dock 18T north of Room 3187 of the Building 371/374 Complex Support Facility. Two additional shipping and receiving docks are in the Support Facility on the southeast corner (Dock 3019 and Dock 5 east of Corridor 3020). Building 374 has two loading docks supporting operations, one on the east side of Room 3811 and one on the south side of Room 3813. Category I and II SNM (i.e., Pu and highly enriched U in metal and oxide forms) is stored in vaults or vault-type rooms in Building 371. The Central Storage Vault (CSV) is in Room 1206 and extends through the subbasement and basement levels of Building 371. The CSV is designed to be ventilated by a nitrogen atmosphere and accessed by the remotely controlled Stacker/Retriever. Other vaults or vault-type rooms are walk-in areas ventilated with air. These areas are Room 1101 and Room 1208 in the subbasement and Rooms 3327, 3331, 3337, 3501, and Room 3606 on the ground floor. Category I and II SNM received in liquid form is stored in tanks in Room 1103 of CWTS in Building 371.

Residue and Waste Drum Maintenance
Residue and Waste Drum Maintenance also occurred daily in Building 371 operations. Residues and wastes are stored in many areas throughout Building 371 and the Support facility. Repackaging of residues may occur in Room 3204 or Room 3602 if a downdraft table is required, in Drum Repack, Room 2307, or in a room designated by radiological protection (i.e., Zone II room).

Sand, Slag, and Crucible (SS&C) Repack
SS&C repack involved repacking ceramic byproduct residues from Pu metal production, which were initially stored for the recovery of residual Pu. These residues resulted from production Pu metal buttons and may contain Pu tetrafluoride, calcium metal, magnesium oxide crucibles, and/or magnesium oxide sand. The SS&C residues will be shipped offsite for processing. This repackaging process takes place in Gloveboxes GB-1 and GB-2 located in Room 3602 of Building 371. After SS&C repackaging has been completed, the containers of SS&C are transferred to the nondestructive assay room, Room 3315 of Building 371. The SS&C nondestructive assay equipment is part of the repackaging process.

Central Storage Vault [CSV; aka, the Stacker-Retriever (S-R)]
The CSV was used to store and retrieve plutonium metal and solid residues. The S-R moved materials between the shipping and receiving areas, the plutonium storage vault, and the plutonium recovery processing areas.

2.2.2 Current Status

This section briefly describes the major functional areas within the Building 371/374 Complex to facilitate understanding the facility layout and activities. The areas within the Building 371/374 Complex where the activities occur are identified. The functional areas are listed alphabetically.

Some areas and equipment contain nuclear material. This material is containerized or non-containerized, and referred to as either in-process material or holdup. In-process material is non-containerized nuclear material in a process area, excluding holdup. Holdup is material remaining in process equipment and facilities after the in-process material, stored material, and product have been removed.

In-process nuclear material and processes are discussed in the functional area descriptions below. All aqueous systems within B371 have been tapped and drained. There are approximately 500 tanks within B371. B371 does not contain any idle equipment with hazardous materials. RCRA-regulated units within B371 are listed in the RLC project file. Included in the list is the Closure Planning Sequence by SET Number.

As of February 17, 2000, there was approximately 8,000 grams of plutonium holdup in B371. This holdup is contained primarily in gloveboxes, plenums, and ductwork. Holdup locations and quantities are presented in bimonthly holdup inventory reports (refer to SSOC, Holdup Inventory Report, 2/17/00, PQHT-00.056). Holdup information is also summarized in Section 4.0.

2.2.2.1 Analytical Laboratories

There are four laboratories in the Building 371/374 Complex to support environmental, safeguards and other regulatory requirements. They include the liquids laboratory, standards laboratory, analytical laboratory, and liquid waste sampling laboratory. These laboratories are located in Rooms 3179, 3408, 3412, and 3805, respectively. The liquids and the analytical laboratories are no longer in use. The Building 371 Standards Laboratory, Room 3408, is operated on a daily basis or as chemical standards need to be made and/or verified.

2.2.2.2 Caustic Waste Treatment

Caustic waste treatment provides for the treatment of miscellaneous caustic and acidic waste solutions containing aged, weapon-grade Pu. Treatment predominately consists of waste collecting, sampling, precipitating, and filtering waste solutions. The equipment for caustic waste treatment is located in the subbasement of Building 371 in Rooms 1103, 1105, 1113 and 1115. Processing is performed in GBs and tanks within these rooms.

2.2.2.3 Receiving (Shipping) and Storing (Retrieving)

Receiving and shipping of onsite and offsite waste, residue, and SNM occurs from Dock 18T north of Room 3187 of the Support Facility. Two additional receiving and shipping docks are in the Support Facility on the southeast corner (Dock 3019 and Dock 5 east of Corridor 3020). Building 374 has two loading docks supporting operations, one on the east side of Room 3811 and one on the south side of Room 3813. Category I and II SNM (i.e., Pu and highly enriched U in metal and oxide forms) is stored in vaults or vault-type rooms in Building 371, including the CSV. Other

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vaults or vault-type rooms include Rooms 1101 and 1208 in the subbasement and Rooms 3327, 3331, 3337 and 3606 on the ground floor. Category I and II SNM received in liquid form is stored in tanks in Room 1103.

2.2.2.4 Residue and Waste Drum Maintenance

Residues and wastes are stored in many areas throughout Building 371 and the Support Facility. Repackaging of residues may occur in Room 3204 or Room 3602 if a downdraft table is required, or in a room designated by radiological protection (i.e., Zone II room).

2.2.2.5 Chemical Storage

Various chemicals are stored and managed throughout the Building 371/374 Complex. Potassium hydroxide (KOH, 6N) is supplied from one 28,500-gal tank and one 10,400-gal tank located just north of B371. A 16,000-gal storage tank in the same area supplies nitric acid (HNO_3, 12N). The KOH and HNO_3 storage tanks share a bermed, compartmentalized area. The chemical makeup area for the facility is in Room 4101, which maintains storage of a variety of chemicals required for facility operations. In addition, the majority of bottled, compressed gases (e.g., propane, argon) are stored on Dock 18T and Dock 5. Liquid nitrogen is stored in a tank immediately north of Dock 18T. Analytical laboratories within the facility maintain chemical inventories to support laboratory operations.

2.2.2.6 SNM Maintenance, Surveillance and Stabilization

Various aspects of the maintenance, surveillance, and stabilization of SNM are planned to be performed in Rooms 3206, 3315, 3341, 3420, and 3602 of Building 371. Room 3206 and Room 3602 have downdraft tables for transfer of material, weighing equipment, furnaces, and access to the CSV Input/Output (I/O). Repackaging activities that do not require a downdraft table can be performed in Room 3541 and Zone II rooms. Sealed pits or pressure vessels can be packaged or leaked tested in Zone II or Zone III rooms.

2.2.2.7 Sand, Slag and Crucible

Sand, slag and crucible repack activities take place in Room 3602. This process uses unit operators who size reduce sand, slag and crucible residues for repackaging and shipment offsite.

2.3 Physical Description of Building 374

Building 374 consists of a main floor, a basement, and a mezzanine, and contains the waste treatment processing area; tanks for receiving and storing liquid process wastes; a drum handling and storage area; and support, mechanical equipment, and utility areas. The building is a free-standing structure approximately 140 feet wide by 145 feet

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long. It is contiguous to the north-south leg of the L-shaped Support Facility. An enclosed shipping and receiving dock is on the east side of the building.

2.3.1 General Construction and Foundation

Building 374 was constructed of reinforced concrete in the same manner as Building 371. It is designed to withstand winds up to 150 miles per hour. The above-grade frame is structural steel. The foundation includes reinforced concrete caissons cast in place in holes drilled into bedrock. The maximum length of the caissons is approximately 30 feet; the maximum diameter is 5 feet.

Since ground water is present above the basement floor level (which is approximately 16 feet below the existing ground surface), a combined subsurface drainage system is included in the design for Building 374. The drainage system connected to gravity outfalls prevents hydrostatic pressure on the basement walls and floors.

The subsurface drainage system consists of porous concrete pipe laterals under the floor connected to a porous concrete pipe laid around the perimeter of the area. Each perimeter pipe drains into a gravity outfall pipe that reaches the surface and drains into North Walnut Creek above the monitoring ponds.

2.3.2 Walls

The below-grade walls are reinforced concrete. The exterior walls above grade are vertical, twin tee, pre-cast concrete siding, or cast-in-place reinforced concrete. The dock walls are concrete block. Interior partition walls consist of gypsum board panels resting on concrete curbs and extending from the floor to the underside of the roof. The interior walls are supported by metal studs. Stairway and elevator area walls are constructed of cast-in-place concrete. The inside of the exterior walls and all gypsum panels are protected with asbestos-cement wainscoting. The exterior walls have a one-hour fire rating.

2.3.3 Floors

Most floors are pour-in-place reinforced concrete, but some mezzanine floors are steel decking supported by structural steel members. The container handling and storage area, utility area, and mechanical equipment room have a clear sealer and hardener on concrete as the finished floor surface. The process laboratories, process and work areas, and receiving tank area have a seamless epoxy floor system which extends 4 inches up the wall to form a covered base in the laboratory area and extends 4 feet up the wall in the tank area. The secured dock area and corridors have an epoxy floor coating. The equipment decontamination and waste loading station floor is also covered with epoxy.

2.3.4 Ceilings

Ceilings in the process areas are generally the underside of the roof or poured reinforced concrete floor above. Ceilings subjected to moderate exposure to acid and caustic are covered with a hi-gloss epoxy finish having excellent chemical resistance and radioactive material decontamination characteristics. Some office and laboratory areas have suspended ceilings with acoustical tile.

2.3.5 Roof

The roof system consists of metal decking with lightweight concrete topping followed by a built-up tar and gravel roofing applied over the concrete topping.

2.3.6 Doors

All exterior, compartment, and room doors are metal with metal frames. All doors located in fire-barrier walls are rated and labeled in accordance with applicable National Fire Protection Association (NFPA) standards. The doors carry fire ratings appropriate to the walls in which they are mounted.

2.3.7 Interfaces

Stairways, an elevator, and mezzanine access ladders all serve as interfaces between the various process rooms in Building 374. Doors isolate the various process rooms from each other. Submarine doors isolate the filter plenums from the process rooms.

2.3.8 Utilities

All of the HVAC and Utilities Systems (with a few minor exceptions) are controllable from the Central Utilities Control Room, Room 2107, of the Building 371/374 Complex Support Facility. Controls on the central control board permit equipment operation as well as controlling parameters such as room dew point and temperature. The Building 371 Data Acquisition and Control System (DACS) provides operating information on almost 1000 building utility and HVAC parameters and alarms at the operator's console within the control room. The DACS was upgraded in 1995 to provide broader indications of temperatures, flows, and pressures for various utilities and ventilation systems. Building 371 and Building 374 have shared electrical power distribution (refer to Section 2.1.8).

Fire Suppression Water Systems
Building 374 has a single riser designated as Riser 374-A in Room 3812. It provides water to the mezzanine, ground floor, and basement areas of Building 374 including three plenums (via plenum deluge system).

Filter Plenum Deluge, and Drain Systems 1 and 2
The filter plenums contain a deluge system in the event of a fire. The plenums drain to special collection systems in the Sub-Basement. System1 drains the plenums on the

north side of the Basement, and System 2 drains the south side. The drains are routed to Deluge Tanks D-713 and D-715 on the north and south sides of the Sub-Basement, respectively. Plenum Deluge Drain Tank D-713 is located in Room 1103, and Plenum Deluge Drain Tank D-715 is located in Room 1210. The tanks contain Raschig rings and were designed to be criticality-safe for solutions containing 150 g/l.

Building 374 Automatic Sprinkler Systems
The Building 374 Automatic Sprinkler Systems consists of a piping distribution system and sprinkler heads. Sprinkler heads are fused-link type conforming to NFPA requirements at the time of construction. Water is supplied from the DWS loop around the building. The loop piping and Post Indicating Valves (PIV) are not considered part of the Automatic Sprinkler System. The Automatic Sprinkler System consists of the following major components:

- Overhead sprinklers
- Pipe distribution system
- Fire water flow alarms
- Inspector test station and valves
- Fire Department connections
- Dry-pipe valves and dry-sprinkler pipes

2.3.9 Heating, Ventilation and Air Conditioning

HVAC System 3 provides conditioned air and confinement functions for Building 374 and the Support Facility locations where radioactive material is stored, transported, and processed. Additional design functions include providing conditioned air for worker habitability and equipment functionality. Air quality requirements include oxygen levels for workers, particulate (e.g., dust) removal, and temperature. The systems consists of the following major components:

- Outside Air Unit (OAU): The OAU supplies fresh outside air to both Building 374 and the Support Facility to replace air exhausted from the facility. The OAU conditions inlet air by filtering and preheating the air. THE OAU includes a preheat coil, a prefilter, and a high-efficiency filter. The OAU is connected to the supply air portion of the HVAC System by ducts.
- Supply Air Units (SAUs) and Fans: Air is received from the OAU and distributed to the required areas by three parallel SAUs and supply fans. The SAUs receive air from the OAU and air recirculated from within the facility (i.e., nonducted return air). The SAUs filter and cool the air prior to distribution.
- Return air plenums and fans: The return air porting of the system facilitates balancing pressure to maintain negative pressure for required areas in Building 374. It also filters and recirculates the air. Return air equipment includes two parallel, 2-stage HEPA filters (FP-322A and FP-322B), a single exhaust fan for each filter, and dampers. The fans and HEPA filter plenums are in Room 2801 of Building 371. A bypass damper can be used to discharge recirculated air directly to the inlet of the exhaust filter plenum.

- Exhaust air plenum and fans: This portion of the system produces the negative pressure for required areas in Building 374 and filters air exhausted from the facility. Exhaust air equipment includes a single 2-stage HEPA filter (FP-321), two parallel exhaust fans, backflow dampers, and an exhaust stack. During normal operations, the exhaust airflow from each HVAC System balances the air supplied to the facility from the OAU.

2.4 Description of Building 374 Operations

2.4.1 Historical Processes

Liquid Waste Treatment
The Building 374 Waste Recovery Processes provides liquid waste treatment of low-level radioactively contaminated wastes. Treatment may consist of acid neutralization, sludge solidification, radioactive decontamination, evaporation, and the saltcrete process. The equipment for liquid waste treatment is located throughout Building 374. The following discussion provides a brief overview of different liquid waste treatment processes.

Wastes can be piped into Building 374 from Buildings 122, 371, 428, 443, 444, 566, 559, 707, 774, 776, 778, 865, 881 and 883. Effluents from the steam plant, Building 443, and the laundries, Buildings 566 and 778, are not RCRA permitted and are currently diverted to the site sewage treatment plant even though the capability remains to pump these effluents to Building 374. Effluents from Building 122 go to Building 428 before being pumped to Building 374.

All tanks in Building 374 can contain radioactive liquids, but are not criticality safe by design. Therefore, these tanks must not exceed 200 grams fissile material per tank. This limit is controlled by criticality safety limits. All system inputs are controlled at the criticality safe acceptance criteria of $\leq$ 0.004 g/L Pu and U_{235} and/or $\leq$ 0.001 g/L Am for liquid waste treatment in Building 374. The highest level of radioactive material input into the system originates from the Building 371 CWTS, which must also meet the Building 374 acceptance criteria. The total process liquid inventory does not normally exceed 1 gram total Pu.

Acid Neutralization of Wastes
Acid neutralization of wastes can be performed in Filter Feed Tanks (D824 A/B). Packaged wastes that are not contaminated can be transferred to these tanks depending on the type of acid. Spent descale acid from Evaporator Acid Descale Tank (D845) can be neutralized in D824 A/B. The Acid Waste Receiving Tanks (D807 A/B) only receive radioactive nitric acid wastes from Building 371. The Unloading Sump Tank (D843) receives phosphoric acid wastes (e.g., dumpster tank, drum) and other acidic wastes not compatible with nitric acid. The acid neutralization process is not in operation, but includes the Acid waste Receiving Tank (D806), D807 A/B, the Neutralization Tank (D808) and D843.

Radioactive Decontamination or Precipitation

Radioactive decontamination (or precipitation) may be performed in three stages, but is currently performed in only the second or third-stage precipitation vessels. Within each stage there are holding tanks, flocculator tanks, reactor and clarifier tanks, pumps, a vent scrubber, and controllers. Process reagents added include Magnesium sulfate ($MgSO_4$), calcium chloride ($CaCl_2$), ferric sulfate ($Fe_2(SO_4)_3$ and Betz polymer. Potassium hydroxide is added to the Waste Receiving Tanks (D804 A/B/C/D) if needed to maintain a pH of 12 or higher. The end product of the radioactive-decontamination process (clarifier effluent) is pumped to the Clarifier Effluent Tanks D826 A/B for sampling. If the results of the sample analysis are below 13,500 pCi/L alpha, the clarifier effluent can be used as feed for the evaporator process. If the effluent cannot be immediately processed, it can be pumped to one of two large (250,000 and 950,00 gallon) storage tanks (T231-A or B), which are connected to the low-level/pond water line between Buildings 374 and 774 for storage. Sludge solidification is currently not in operation.

Evaporation Process

Evaporation Process produces a concentrate (brine) that is further treated in the spray dryer/saltcrete operation, and product water, which is sent to the boiler plant for steam production, or is used in the Building 373 Cooling Tower. The evaporation process concentrates soluble materials from low-level desaltable aqueous wastes to produce the concentrate (brine). Aqueous wastes treated by the evaporator are received from Building 122, and include incidental water, pond water, and wastes from Building 444. Clarifier effluent from radioactive decontamination is also treated in the evaporator. The aqueous wastes processed have a radioactivity at or below 13,500 pCi/L total alpha. Those wastes are stored in the Evaporator Feed Tanks D802 A/B/C, Storage Tanks D801 A/B/C, and Tanks T231 A/B. Wastes containing in excess of 13,500 pCi/L alpha are processed by the radioactive decontamination process.

Spray Dryer and Saltcrete

The spray dryer and saltcrete operation immobilizes concentrate (brine) and dry salt for disposal as solid product. The process uses storage tanks, a spray dryer, mixing tanks, and various filters. The Spray Dryer Feed Tank D878 feeds the Spray Dryer (W803) where concentrate is pumped through a spray atomizer into a hot air stream heated with natural gas. This system has undergone a number of changes to lessen the threat of fires: the feed chemistry has fewer nitrates than during startup; the filters have been changed to fiberglass/Goretex, which are fire resistant; and the use of fuel oil has been eliminated. The air from the Spray Dryer Bag Filter (FL-803) is exhausted through two separate HEPA filters (FL-804 A/B), which remove salt to meet emission requirements. The dry salt is mixed with concentrate (brine) from storage and cemented in the Saltcrete Mixing Tank (D883B). This slurry is then poured into lined plywood crates. When cured, the saltcrete is classified as low-level mixed waste.

Operations in the Building 371/374 complex still require a number of chemicals. Chemicals are routinely stored in the facility in four laboratories (Rooms 3179, 3408, 3412, and 3805) and a chemical makeup area (Rooms 4101 and 4104). The chemical makeup area is supplied potassium hydroxide, KOH (6N) and nitric acid, HNO_3 (12N)

from storage tanks located outside the building. Other chemicals routinely located in the chemical makeup are $CaCl_2$, $MgSO_4$, $Fe_2(SO_4)_3$, and phosphoric acid, H_3PO_4.

2.4.2 Current Status

The status of the waste treatment process equipment is that any given process described above can and will be operated on an as-needed basis. The total process liquid inventory does not nominally exceed 1 kilogram Pu. As of February 17, 2000, there was approximately 1 gram of holdup in B374, as fissile material. This holdup is contained in the ductwork. B374 does not contain any idle equipment with hazardous materials. See the RLC project file for a Master List of Building 374 RCRA-Regulated Units. Included in the list is the Closure Planning Sequence by Set Number.

Acid Neutralization of Wastes
The highest level of radioactive material input into the system originates from the Building 371 CWTS, which must also meet the Building 374 acceptance criteria. Again that acceptance criteria is:

- All tanks in Building 374 can contain radioactive liquids, but are not criticality safe by design. Therefore, these tanks must not exceed 200 gram fissile material per tank. This limit is controlled by criticality safety limits. All system inputs are controlled at the criticality safe acceptance criteria of $\leq$ 0.004g/L Pu and U_{235} (and/or $\leq$ 0.001 g/L Am) for liquid waste treatment in Building 374.

Spent descale acid from the Evaporator Acid Tanks D-807A and D-807B can be neutralized in Tanks D-824A and D-824B. The acid neutralization process is not in operation, but includes the Acid Waste Receiving Tanks D-806, D-807A, D-807B, and Tanks D-808 and D-843, the Neutralization Tanks.

Radioactive Decontamination or Precipitation
Radioactive decontamination or precipitation may be performed in three stages, but is currently performed only in the second or third-stage precipitation vessels. Waste receiving Tanks D-802A-C and radioactive decontamination or precipitation Tanks D804A-D are located in Room 2804 of Building 374. This process is operated on an as-needed basis such that as feed solution tanks fill, the process is started to precipitate and decontaminate the accumulated waste liquids.

Evaporation Process
Feed storage for the Evaporation Process is in Tanks D-802A, D-802B, and Tank D-802C which are located in Room 2804 of Building 374. The combined feed storage of these three tanks in approximately 60,000 gallons. The four-stage Evaporation Process evaporator Tanks T-802, T-803, T-804, and Tank T-805 are located outside directly north of Building 374. The Evaporation Process is operated on an as-needed basis such that as feed solution tanks fill, the process is started to evaporate the accumulated waste liquids.

Spray Dryer and Saltcrete
Evaporation produces a concentrate (brine), which is further treated in the Spray Dryer/Saltcrete Process. The Spray Dryer, Chamber W-803 in located in Room 4812 of

Building 374. Supporting Spray Dryer equipment such as the Spray Dryer Feed Tank D-878 (located in Room 3810), Spray Dryer Tank 228 (located north of B-374), and the Spray dryer bag filter is located in Room 4802 of Building 374; the Spray Dryer is located outside north of Building 374 directly below Room 4812 of Building 374. The salt product from the Spray Dryer is feed for the Saltcrete Process. Both of these processes are operated on an as needed basis.

Waste 55-Gallon Drum Handling
Waste 55-gallon drums are filled in various areas of Building 374 where wastes are generated. The waste drums are filled, sealed and disposed of according to Site requirements and waste acceptance criteria for wastes generated in Building 374. The waste drum areas are operated on an as-needed basis.

2.5 Building 373 – Cooling Tower

2.5.1 Physical Description

Building 373 is the Building 371/374 Cooling Tower/Pump-House. The cooling tower is constructed from wood and Transite™ materials. Building 373 is a small reinforced concrete structure 18' - 6" X 16.0' X 12.0' high constructed of reinforced concrete. B373 has a larger basement (also reinforced concrete structure also), or pump vault, which is approximately 18' wide X 40' long X 20' high and contains three large pumps that operate the three tower system. The Building 373 Pump House temperature and ventilation are controlled by the HVAC System 8.

2.5.2 History and Current Status

The Building 373 Cooling Tower is currently in operation. Utility operators say the cooling tower's equipment is in very poor condition and that a new replacement cooling has been scheduled. Construction of a new cooling tower has been delayed twice.

2.6 Building 374A – Carpenter's Shed

2.6.1 Physical Description

The Carpenter Shop, Building 374A, is located at the east end of Dock 5. The building is constructed of wood in two attached sections. The east section is approximately 12' X 20' X 8' high, and the west section is approximately 27' X 20' X 8' high, for a combined square footage of approximately 800 square feet. There are approximately 13 cargo containers and storage sheds that are adjacent to the Building 374A Carpenter Shop.

2.6.2 History and Current Status

The Building 374 Carpenter Shop has served the carpenter support needs of the Building 371/374 Complex for approximately 20 years and is currently operating. Chemicals used include carpenter's glue and Silicone 732 sealant. This structure is made from wooden frame structure and uses Transite siding (asbestos containing

material) and has several cargo containers for storage of wood and other carpenter supplies.

2.7 Building 377 – Air Compressor Building

2.7.1 Physical Description

B377 is the Air Compressor Building that supports the cement pneumatic transfer system for the Building 374 Waste Cementation Process. It is located directly north of Building 374. This support building has 120 square feet of floor space and is approximately 15'- 4" X 10.0' X 12.0' tall at the roof eve. The walls and roof are corrugated sheet metal. The floor is reinforced concrete. The utilities for Building 377 consists of electricity for the air compressors, automatic valves, and lighting for night operation. The facility has electric heaters to prevent damage to the air compressors and piping from freezing during cold winter temperatures.

2.7.2 History and Current Status

Building 377 operated when the waste cementation processes were operating in Building 374.

2.8 Building 378 – Waste Collection Pump House

2.8.1 Physical Description

The Building 378 Waste Collection Pump House is also known as the Building 374 Product Water Pump House. This support building has 130 square feet of floor space and is approximately 14.0' X 10.0' X 8.0' tall at the roof eve. The floor is reinforced concrete. The walls and roof are corrugated sheet metal. The utilities for Building 378 consists of electricity for the pumps and lighting for night operation. The facility has electric heaters to prevent the pumps and pump piping from freezing during cold winter temperatures.

2.8.2 History and Current Status

This facility is not currently in operation. This system has never been operational.

2.9 Building 381 – Fluorine Building

2.9.1 Physical Description

Building 381 is the fluorine storage building for the Building 371 Direct Fluorination Process. Building 381 is a concrete block construction with poured reinforced concrete floors and roof. The fluorine supply building was decommissioned approximately 12 years ago. This support building has 1320 square feet of floor space and is approximately 30' X 42' X 12' tall at the roof eve. The utilities for this building include steam, electricity, argon, and nitrogen. The Building 381 temperature and ventilation is

controlled by HVAC System 7, which is located on roof of Building 381. Building 381 is divided into 5 rooms or compartments. Four of the rooms were designed for storage of fluorine gas cylinders hooked to fluorine gas manifolds to supply the B371 Direct Fluorination Process.

2.9.2 History and Current Status

B381 operated as designed for approximately three years when the "hot startup" of Building 371 began in the 1980 through 1983 time frame. The fluorine gas cylinders were removed and the building was decommissioned in 1988.

Since 1988, Building 381 has been used by several different groups. The two south rooms and the center room are presently being used by the Building 371/374 Paint Shop for a painting work-shop and office. Chemicals stored in Building 381 include all the normal Paint Shop supplies such as paint thinner, lacquer thinner, paint remover, epoxy, paints, Dow Corning 732 sealants, Chapco 818 contact bond adhesive, potassium iodide, caulking, etc.. All flammable liquids are stored in approved flammable liquid cabinets. The center control room area is being used for miscellaneous equipment and supply storage. The two north rooms of Building 381 are being used by two work-groups for work, storage, and office or break areas.

2.10 B371 Cluster Exterior Tanks

There are a number of exterior tanks included in the Building 371/374 Cluster. Most of these tanks supplied the Cluster with various liquefied gases, cement, acids, liquid potassium hydroxide, and other chemical products.

2.10.1 Physical Description

These tanks are exterior to the buildings and are located to the north of the cluster as follows:

- Tank 163, the west Product Water Tank, north of Building 374
- Tank 164, the east Product Water Tank, north of Building 374 -Tanks 163 and 164 have an in-ground concrete berm approximately 40' X 140' X 8' deep. This concrete in-ground berm has a large gate valve in the northeast corner for draining the berm. The in-ground berm also has two 24" storm drain pipes leading into it one on the west berm wall at the bottom another storm drain pipe in the west wall near the top south corner.
- Tank 165, the Cement Silo, west of Building 371
- Tank 167, Nitric Acid Storage Tank (aka D-222), north of Building 374 – Tank 167 has an asphalt lined earth berm approximately 4 feet deep all around the tank.
- Tank 168, Potassium Hydroxide Storage Tank (AKA D-225), north of Building 374
- Tank 169, Potassium Hydroxide Storage Tank (aka D-842), north of B374 – The two Potassium Hydroxide Storage Tanks, Tanks 168 and 169 share an asphalt lined earth berm all around the two tanks approximately 4 feet deep.
- Tank 170, Liquid Nitrogen Storage Tank, north of Building 374 & Door 17D

- Tank 224, 1ST Effect Vapor Body Tank (water with sodium hydroxide), N of B374
- Tank 225, 2ND Effect Vapor Body Tank (water with sodium hydroxide), N of B374
- Tank 226, 3RD Effect Vapor Body Tank (water with sodium hydroxide, N of B374 – Tanks 224, 225, and Tank 226 have an L-shaped plywood weather walls at approximately the Mezzanine level of Building 374; the plywood wall is approximately 36' X 8' X 1" thick.
- Tank 227, 4TH Effect Vapor Body Tank (water with sodium hydroxide), N of B374 – All of the 4 Tanks 224, 225, 226, & 227 have a concrete berm constructed from concrete portable road barriers 8" X 24" around and under the tanks approximately 20' X 50' X 3' high; the constructed berm is lined with a neoprene-type material to make it sodium hydroxide and/or weak acid resistant.
- Tank 228, Spray Dryer Tank, north of Building 374 – Around Tank 228, Spray Dryer Tank, is a 15' X 15' X 8' X1" thick plywood weather wall with a hasp locking 3' wide plywood access door. Underneath Tank 228 is 8' X 8' X 1' X 6" thick concrete berm. The upper part of Tank 228 is housed inside the Mezzanine Level Building 374 Room 4812. Room 4812 has a concrete floor supported on 8" I-beams from the ground level. The exterior of Room 4812 is covered with corrugated metal siding.
- Tank 262 (aka Tank 171), underground storage tank for No. 2 diesel fuel – Tank 262 has been drained, taken out of service, and it has been filled with foam. It has been left in place, underground.
- Tank 262A (aka TK-4), aboveground storage tank for No.2 diesel fuel

2.10.2 History and Current Status

The following is a listing of the status of the tanks included in the Building 371/374 Complex Cluster:

- Tank 163, This tank was never put into service. (Out of service.)
- Tank 164, This tank was never put into service. (Out of service.)
- Tank 165, the Cement Silo, (Operable on an as-needed basis.)
- Tank 167, Nitric Acid Storage, (Operable on an as-needed basis.)
- Tank 168, Potassium Hydroxide Storage, (Operable on an as-needed Basis.)
- Tank 169, Potassium Hydroxide Storage, (Operable on an as-needed Basis.)
- Tank 170, Liquid Nitrogen Storage, (In service.)
- Tank 224, 1ST, (Operable on an as-needed basis.)
- Tank 225, 2ND, (Operable on an as-needed basis.)
- Tank 226, 3RD, (Operable on an as-needed basis.)
- Tank 227, 4TH, (Operable on an as-needed basis.)
- Tank 228, Spray Dryer Tank, (Operable on an as-needed basis.)
- Tank 262, (aka Tank 171) Underground storage No. 2 fuel Tank (Out of service.)
- Tank 262A (aka TK-4) Above ground storage No. 2 fuel tank, (In service.)

2.11 Individual Hazardous Substance Sites (IHSSs), Potential Areas of Concern (PAC) and Under Building Contamination (UBC) Sites

There are fifteen IHSSs/PACs and two UBCs in and around the Building 371/374 Cluster. The IHSSs/PACs include the following with descriptions:

- IHSS/PAC 300-135: The incident involved the Building 373 Cooling Tower whereby a cleaning solution leaked from a small retention pond, through a dirt dike, through a gate valve into Walnut Creek.
- IHSS/PAC 300-151: Tank 262 is a 47,500 underground tank located north of Building 371. Four documented Number 2 diesel fuel spills, ranging from 10 to 196 gallons, were spilled on the ground.
- IHSS/PAC 300-156.1, Operable Unit 14: The Building 371 Parking Lot, during construction, was discovered to contain contaminated soil. Results ranged from 3 to 704 disintegration per minute per gram. The volume of soil removed is stated at 250 cubic yards.
- IHSS/PAC 300-186, Operable Unit 13: Building 374, Valve Vaults 11, 12, and 13 are located along the process waste line south of Building 374. These valve vaults were involved in several leaking incidents resulting in release of process waste to the environment during the 1985-1989 time frame.
- IHSS/PAC 300-188, Operable Unit 8: This incident involved a leak of approximately 55 gallons of a mixture nitric acid and hydrochloric acid. It is likely that the mixture was a waste metal leaching solution originating from the 400 Area which suggests that it might have contained some trace heavy metals.
- IHSS/PAC 300-206, Operable Unit 10: Tank D-836 was a 19,000-gallon, carbon steel tank used for hazardous waste storage. The tank was located north of the Buildings 371/374 and a documented spill of condensate water occurred on February 18, 1980. The tank was used to hold off-specification Building 374 Product Water. The spill in 1980 was found to contain low concentrations of tritium.
- IHSS/PAC 300-212, Operable Unit 15: Building 371 Drum Storage Unit 63, located in Room 3420. Interviews with operations personnel indicate that a release has never occurred from any drum stored in Room 3420. Some of the allowable constituents of the waste include transuranic waste, carbon tetrachloride, 1,1,1-Trichloroethane (1,1,1-TCA) and toluene.
- IHSS/PAC 300-700: During construction of the PSZ (now referred to as the PA) an old burial trench was discovered approximately 500 yards northwest of Building 371. A 1975 document states that valves, pipefittings, tire chains, and other subcontractor materials were buried "north of Building 331" and "north of the Firebarn". The scrap was moved to the Sanitary Landfill Site.
- IHSS/PAC 300-701, A Sulfuric Acid Spill, Building 371: On December 20. 1989, a 55-gallon drum containing twenty gallons of sulfuric acid solution was found ruptured of Dock 9t on the east side of Building 371/374. Approximately 19 of the twenty gallons of dilute sulfuric acid solution were spilled. Analytical results of the liquid in the drum indicated a pH of 1.36.
- IHSS/PAC 300-702, Pesticide Shed: Building 367, directly west of Building 371 outside of the PA, has been used to store pesticides and herbicides since 1952 when the first spillage is assumed to have occurred. In 1988, large quantities were

being stored there and the building showed signs of spills and leakage. There were no spill containment features; therefore, release of contamination to a nearby drainage ditch may have been possible.

- IHSS/PAC 300-704, Roof Fire, Building 381: A small fire occurred on the roof of Building 381 while venting a leaking cylinder of fluorine. The fluorine attacked the iron vent pipe causing the release of smoke and vapor. Smoke and fluorine vapors were released.
- IHSS/PAC 300-705, Potassium Hydroxide Spill North of Building 374: This spill occurred in May 1989. During this event, a small spill of potassium hydroxide occurred at the storage tank on the north side of Building 374. A small amount of caustic mixed with rainwater in the containment berm.
- IHSS/PAC 300-706, Evaporator Tanks North of Building 374: While performing a pressure test of Tank 805, a leak occurred from a defective gasket. Tank 805 is the fourth vapor body on the evaporator system which concentrates low-level waste. It is located north of Building 374 and has a 20,000-gallon capacity. The liquid spilled onto the plywood decking, leaked through the decking and dripped onto the concrete slab located 22 feet below on the ground. The spill consisted of approximately two gallons that had mixed with roughly sixty gallons of rainwater. The analytical results of samples taken for the sump pit contained 25-30 mg/l nitrate, 0.1 mg/l total chromium, greater than 10.02 mg/l silver, 2 to 32 pCi/l gross alpha activity, and 1.03 pCi/l gross beta activity.
- IHSS/PAC 300-707, Sanitizer Spill: A tank from a trucked owned by an off-site vendor leaked sanitizer on the shoulder of the road at Sixth Street and Sage Avenue. Approximately three gallons of sanitizer were spilled. The sanitizer consisted of water and formaldehyde mixture.
- IHSS/PAC 300-708, Transformers North of Building 371: there are six transformers north of Building 371; Transformer 371-1 had staining on the pad beneath the valve when inspected in1991, which indicates leakage. The transformers are all located within a rock-filled berm.
- IHSS/PAC 300-711, Ni-Cad Battery Spill Outside of Building 373: On January 29, 1992, Maintenance personnel placed 20 used Ni-Cad rechargeable batteries in two wood boxes on a pallet outside of Building 373. During routine surveillance of the boxes on January 30, 1992, it was noted that on corner of the box and surrounding ground were wet due to release of less than one quart of potassium hydroxide solution from the used batteries. The material released consisted of potassium hydroxide, cadmium and cadmium hydroxide, nickel and nickel hydroxide, and lithium hydroxide. The measured pH range was 10 to 14. The solution likely contained cadmium in excess of the TCLP limit of I mg/l. One-third of the pallet, two wood boxes and approximately two feet of contaminated soil were collected in plastic bags and placed in drums, which were moved to a 90-day accumulation area.
- IHSS/PAC 300-712, Antifreeze Spill North of Building 373: On October 25, 1992, a one-half gallon quantity of antifreeze was spilled on the pavement north of Building 373 by a street sweeper. The antifreeze consisted of approximately 50% ethylene glycol and 50% water. The RCRA Contingency Plan was implemented, and the spill material was absorbed by absorbent material and packaged. A hazardous waste characterization was made, which indicated that the material did not need to be managed as RCRA hazardous waste.

- IHSS/PAC 300-714, Laundry Waste Water Spill From Tank T-803, North of Building 374: On November 17, 1994, while performing restart operations of the Building 374 Evaporator System a release of a hazardous waste was reported from Tank T-803. Approximately 50 gallons of evaporator process aqueous waste (i.e. laundry waste water) was released to the secondary containment berm and approximately 5 gallons was sprayed to the dirt road immediately north of the bermed area. The material released was a mixture of the current evaporator process aqueous waste feed and previous waste feeds, which have been determined to be an F-listed hazardous waste.
- IHSS/PAC 300-715, Battery Acid Spill: On June 11, 1997, while moving a wood pallet loaded with lead acid batteries north of Building 371 (near dock 18T), a forklift operator reported that eight of the batteries shifted and fell off the pallet resulting in a spill of sulfuric acid. The RFETS HAZMAT Response Team neutralized an estimated three gallons of acid using sodium bicarbonate. Initial soil screening for pH confirmed that the spill liquid was sulfuric acid from the batteries. Additional sampling for Total CLP Metals was conducted due to the possibility of elevated lead from the batteries. The results were typical of background levels with the exception of elevated sodium (due to the use of sodium bicarbonate). All areas affected by the sulfuric acid were remediated.

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The two UBCs are associated with Building 371/374 Cluster. The following is a description of these two UBCs:

- UBC-371 is because of documented spills of radioactively contaminated nitric acid (HNO_3) and other solutions that have occurred in the Subbasement of Building 371. Building 371 also has foundation drains and process drains under the Subbasement floors of various process tank rooms. It is possible that some of the radioactive solutions might have leaked through the Subbasement floor or slab on to the soil below. Contamination from spills and/or leaks could be in the ground water around the base and/or foundation of the building.

- UBC-374 is because of documented spills of radioactively contaminated nitric acid (HNO_3) and other solutions that have occurred in the subbasement of Building 374. Building 374 also has foundation drains and process drains under the Basement floors of various process tank rooms. It is possible that some of the radioactive solutions might have leaked through the Basement floor or slab on to the soil below. Contamination from spills and/or leaks could be in the ground water around the base and/or foundation of the building. It is possible that some of the radioactive solutions might have leaked through the subbasement floor on to the soil below.

With the exception of UBC-371, UBC-374, IHSS/PAC 300-206, and IHSS/PAC 300-702, all of the CERCLA Sites listed above have been proposed for No Further Action (NFA).

3.0 SUMMARY OF CHARACTERIZATION ACTIVITIES

This section discusses the 371/374 Building Cluster characterization activities performed, including analysis of historical data and process knowledge and conduct of RLC. Section 3.1 presents the data quality objectives used to assess data and process knowledge, identify data gaps, and determine sampling and quality requirements. Section 3.2 presents historical radiological data and process knowledge, and radiological RLC characterization activities performed. Section 3.3 presents historical chemical data and process knowledge, and chemical RLC characterization activities performed.

3.1 Data Quality Objectives (DQOs)

The Problem

RLC
Some hazards are present within the 371/374 Building Cluster, but the actual location of hazards (including contamination), contaminant concentrations, and the associated quantities of contaminated media are unknown relative to the requirements associated with the D&D program. Determination of the types and quantities of radiological and chemical hazards, and the associated consequent waste streams, are required to 1) confirm or revise the facility typing; 2) identify decommissioning approaches and technologies; 3) develop worker health and safety controls; 4) develop waste management and material disposition options; and provide input to the design of in-process and pre-demolition survey characterization. Based upon historical and process knowledge of the buildings, the potential contaminants of concern include radionuclides ($U_{233/234}$, U_{235}, U_{238}, $Pu_{239/240}$ and Am_{241}), RCRA toxic metals (refer to 40 CFR 261), beryllium, asbestos, and polychlorinated biphenyls (PCBs).

PDS
The problem involves determining whether or not the survey unit is suitable for unrestricted release in accordance with the Pre-Demolition Survey Plan (PDSP).

The Decisions

RLC
The critical technical decisions for the project were as follows:

- What floors, walls (interior and exterior), ceilings, roofs, equipment and/or other media (e.g., liquids in equipment) are radiologically and/or chemically contaminated or contain ACM?
- What are the radiological and chemical waste streams that will result from D&D, and what are the associated volumes?
- Are the hazards consistent with the preliminary facility typing?
- How much, if any, additional characterization will be needed during in-process characterization?

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PDS

The decision is verification that unrestricted release criteria for radiological and non-radiological hazards have been met.

Inputs to the Decisions

Inputs are quantitative data produced from the radiological survey of surfaces for removable and total contamination, and paint, building material, and surface smear samples for radiological and chemical contamination. Historical data and process knowledge were also reviewed for use. In addition, unrestricted release criteria and waste management regulations were used (see Decision Rules below).

Decision Boundaries

All facilities and all materials and equipment contained therein were considered as within the project boundaries. Environmental media were not considered within the project boundaries.

Decision Rules

Radiological and chemical decision rules are based on the premise that the Reconnaissance Level Characterization is an initial characterization for material disposition (i.e., reuse, recycling or disposal) purposes. Decision rules are applied based on process knowledge, facility walkdowns, and/or sampling and analysis.

Radionuclides

1. If all radiological survey and scan measurements are below the surface contamination guidelines provided in DOE Order 5400.5 (Radiation Protection of the Public and Environment), and if all radiological sample measurements are below the volume contamination thresholds provided in the No-Rad-Added Verification (NRA) Program (refer to Kaiser-Hill letter to DOE, RFFO, Application of Surface Contamination Guidelines from Department of Energy Order 5400.5 – WAH-064-98, March 10, 1998), the related volume of material is classified as not radiologically contaminated.
2. If any radiological survey or scan measurement exceeds the surface contamination guidelines provided in DOE Order 5400.5, the related surface area is classified as radiologically contaminated. For PDS, the survey units must be evaluated per the statistical tests described in Section 7.0, Data Analysis and Quality Assessment, of the PDSP.
3. If any radiological sample measurement exceeds the volume contamination thresholds provided in the NRA Verification Program (refer to Kaiser-Hill letter to DOE, RFFO, Application of Surface Contamination Guidelines from Department of Energy Order 5400.5 – WAH-064-98, March 10, 1998), the related volume is classified as radiologically contaminated.
4. If any radiological sample measurement exceeds 100 nanocuries per gram of transuranic material, the associated volume is classified as transuranic (TRU) waste.

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Hazardous Waste

If decommissioning waste is mixed with or contains a listed hazardous waste, or if the waste exhibits a characteristic of a hazardous waste, then the waste is classified as hazardous waste in accordance with 6 CCR 1007-3, Parts 261 and 268.

Hazardous Substances

If material contains a listed hazardous substance above the CERCLA reportable quantity (40 CFR 302.4), the material is subject to CERCLA regulation (i.e., remediation and/or notification requirements).

Beryllium

If surface concentrations of beryllium are equal to or greater than 0.2 $\mu g/100\ cm^2$, the material is considered beryllium contaminated per the DOE regulation (10 CFR 850) and the RFETS Occupational Safety and Industrial Hygiene Program Manual, Chapter 28, Chronic Beryllium Disease Prevention Program.

PCBs

- If material contains PCBs from the manufacturing process, the material is classified as PCB Bulk Product Waste, and is subject to the requirements of 40 CFR 761.

- If PCB contamination from a past spill/release is suspected, or if a PCB spill is discovered that has not been cleaned up, the associated material is classified as PCB Remediation Waste and is subject to the requirements of 40 CFR 761.

- If a waste or item contains PCBs in regulated concentrations, the waste or item is considered PCB-regulated material and subject to the requirements of 40 CFR 761.

Asbestos

If any one sample of a sample set representing a homogeneous medium results in a positive detection (i.e., >1% by volume), then the material is considered asbestos containing material (ACM; 40 CFR 763 and 5 CCR 1001-10).

Tolerable Limits on Decision Error

Tolerable limits on decision error (95% confidence) are applied to the MARSSIM design of survey and sampling plans (i.e., in determining the number of samples required), as well as actual measurement data resulting from implementation of the plans. Sampling design error for radiological sampling was considered by requiring a minimum number of uniformly distributed (n=30) and biased surveys (n=10) to be performed in each survey area. Survey area size limits are based upon the requirements of Table 1 of PRO-475-RSP-16.01. Survey areas were developed based on current radiological

postings, the procedurally driven size limitations, function and use of area, and where possible, maintaining contiguous survey areas.

To conform with the RLC requirements (and the PDS requirements for Type 1 facilities), a 95% confidence limit was also used for hazardous waste, hazardous substance, beryllium, and PCB sampling. Decision error does not apply to asbestos sample sets per 40 CFR 763. Results are compared with the decision rules on a sample-by-sample basis.

Optimization of Design

Radionuclide characterization was performed in a subjective manner to initially classify areas for material disposition (i.e., reuse, recycling or disposal) purposes. Radiological field measurements, sampling, and preparation for laboratory analyses were performed in accordance with approved RFETS site procedures, including Appendix D of the RFETS Decontamination and Decommissioning Characterization Protocol (MAN-077-DCCP) and the Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). The PDSP was used for Type 1 facilities only.

Chemical characterization of Type 2 and 3 facilities was performed in accordance with Section 6.0 and Appendix D of the RFETS Decontamination and Decommissioning Characterization Protocol (MAN-077-DDCP). Chemical characterization of Type 1 facilities was performed in accordance with Section 4.0 of the PDSP.

3.2 Radiological Characterization

Reconnaissance Level Characterization (RLC) and Pre-Demolition Survey (PDS) was performed to quantify the nature and extent of radioactive hazards that may be present in the 371/374 Building Cluster, to confirm or revise the preliminary facility classifications, and to support the unrestricted release of Type 1 facilities in accordance with the RFETS Pre-Demolition Survey Plan for D&D Facilities (MAN-127-PDSP). This section discusses historical radiological data and process knowledge and discusses RLC/PDS conducted. Radiological hazards and new data generated during RLC/PDS are discussed in Section 4.0. Historical and RLC/PDS radiological data are presented in the project file, including survey/scan and laboratory data. The file presents documentation on sample chain-of-custody, sample locations, and laboratory results.

RLC/PDS surveys/scans and sampling was conducted and recorded by survey area and survey unit. The findings for the 371/374 interior are summarized in Section 4.0 by survey area/unit and SET. Findings for the 371/374 exterior and other cluster structures are summarized by survey area/unit. Survey areas are described in Table 3-1 below.

Table 3-1. 371/374 Cluster RLC Survey Areas

BLDG	SURVEY AREA	SET	DESCRIPTION
371	A	4	Rms. 1115 & 1113, and CAs within Rms. 1103 and 1210 in sub-basement
371	B	4 & 12	Rms./corridors, including 1103, 1101, 1111, 1006, 1005, 1004, 1003, Stairwell #5, 1216, 1210, 1208, 1121, 1121A, 1124, 1123, 1204, 1202, 1214, and Stairwell #1
371	C	12 & 13	Rms./corridors at south end of basement, including 2202, 2011, 2202A, 2202B, 2202C, 2205, and Stairwell #3
371	D	5, 12 & 13	Rms./corridors, including 2012, 2203, 2201, 2207, 2223, 2213, 2217, 2010 (corridor), 1216, Stairwell #5, 2221, 2225, and 2009 (corridor)
371	E	5 & 12	Rms., including 2307 & 2325, and Stairwell #4
371	F	12 & 13	Rms./corridors at northwest end of basement, including Rms. 2305, 2301, 2309, 2303, 2304, 2306, & 2018; Stairwells #1 & #2; and Corridor 2014
371	G	12 & 13	Rms./corridors in basement, including Rms. 2310, 2316, 2321 & 2016; Corridor 2015; and a portion of Corridor 2009
371	H	9 & 12	Non-radiological rms./offices at east end of basement, and Rms. 1001 & 1002, Elevator #1, and Stairwell #6 in the sub-basement
371	I	3 & 8	Process areas/rms. on main floor, including 3305, 3323, 3321, 3335, 3327, 3329, 3331, 3206 & 3204
371	J	2, 6, 8, 11 & 12	Process areas/rms. on main floor, including 3412, 3602, 3511, 3515, 3567A, 3545, 3543, 3557 & 3567B
371	K	3, 8, 9, 11, 12 & 13	Rms./corridors on main floor, including Corridors 3341, 3035, 3031A, 3034/3404A & 3033; Rms. 3337, 3037, 3537A, 3541, 3036, 3501, 3315, 3301, 3030, 3208, 3406, 3404, 3404B, 3402, 3408, 3436, 3412, 3513 & 3420; and Stairwells # 1, 2 & 3
371	L	10, 11 & 12	Rms./corridors on the main floor, including Corridors 3031B, 3032, 3042, 3040, 304; and Rms. 3434, 3432, 3432A, 3432B, 3430A, 3430, 3721, 3717, 3709, 3719, 3606, 3189, 3713, 3715 & 3701
371	M	9 & 12	Non-radiological rms./administrative offices in the southwest corner of main floor level, including those west of Corridor 3017A, including Corridor 3017a.
371	N	9 & 12	Non-radiological rms./administrative offices in the southeast corner of main floor level, including those east of Corridor 3017A, excluding Corridor 3017A.
371	O	9	Non-radiological rms./administrative offices/docks in the northeast corner of main floor level, including those north of Corridor 3023 (Rms. 3038, 3583, 3581, 3044, 3587, 3043 & 3585)
371	P	1 & 12	North end of Rm. 4301and Stairway #2
371	Q	1 & 12	Rms. 4303, 4305, 4307, & south end of 4301, and Stairway #1
371	R	1 & 12	Rms. 4202, 4204, 4003 & 4004, and Stairway #3
374	S	7 & 12	Rms. 4101, 4102, 4103, 4104, 4105 & 4106, and Stairways #6 and #7
374	T	7	Rm. 2804 including stairwell
374	U	7	Rms. 2801, 2805, 2807, 2808, 2811 & 2812, and Stairwell #8
374	V	7	Rms. 3801 and 3803
374	W	7	Rms. 3802, 3804, 3805, 3806, 3807, 3808, 3809, 3810, 3811, 3812, 3813 (including downward Stairwell #8), 3168 & 3168A
374	X	7	Rms. 4803, 4804, 4805, 4806, 4807 & 4815 (including Stairwell #9)
374	Y	7	Rms. 4801, 4802, 4810, 4812 & 4814 (including stairway)
371/374	Z	No Assigned SET	External surfaces/roofs
371/374	AA	14	Diesel fuel/storage tank 262A, and liquid nitrogen storage tank 170 exterior to 371/374
371/374	BB	14	1st, 2nd, 3rd & 4th effect vapor body tanks (H20 + NAOH) 224 - 227 exterior to 371/374

Table 3-1. 371/374 Cluster RLC Survey Areas (Continued)

BLDG	SURVEY AREA	SET	DESCRIPTION
371/374	CC	14	Product water tanks 163 & 164; cement silo 165; nitric acid tank 167 (aka D-222), KOH storage tanks 168 (aka D-225) and 169 (aka d-842); and spray dryer tank 228 exterior to 371/374
373	DD	16	Interior of cooling tower and pump house
377/381/ 374A	EE	16	Interiors of B377 (air compressor bldg.), B381 (fluorine storage/paint shop), & 374A carpenter shop
378	FF	16	Interior of B378 (waste collection pump house)
377/378/ 381/374A/ 373	GG	16	Roof and exterior of B377, B378, B381, B374A & B373

3.2.1 Summary of Historical Data

The conduct and availability of routine radiological surveys is generally dependent upon the function of the facility, current radiological conditions, postings for the area, and Radiological Control Manual requirements. However, posting criteria typically are based only upon removable contamination in accordance with the Site Radiological Control Manual. Therefore, routine radiological surveys provide general radiological information but do not necessarily indicate the level of decommissioning required. Additionally, because the entire radiological portion of the facility is posted as a fixed contamination area, the potential for encountering fixed contamination is significant. Table 3-2 summarizes those areas/structures in the Building 371 complex where routine radiological surveys are obtained.

Table 3-2 Summary of Available Historical Radiological Survey Data.

Building	Routine Radiological Surveys Taken?
371	Yes
373	Yes
374	Yes
374A	No
377	No
378	Yes
381	Yes
371/374 Cluster Exterior Tanks	No

Current radiological surveys were reviewed in conjunction with building postings and used to delineated Survey Areas of similar radiological condition and history. Periodic and routine radiological surveys in Building 371 are conducted in accordance with 3-PRO-164-RSP-07.01, *Radiation, Contamination, and Airborne Radioactivity Survey Frequency.* Typically, Building 371 routine surveys do not include Total Surface Activity (TSA) measurements due to elevated beta-gamma radiation in the building, and

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therefore, are not directly comparable to RLC surveys. It should be noted that all current routine surveys show contamination levels appropriate to the applicable radiological posting for that area.

Building 371 General Radiological Conditions

All of the Building 371 radiological areas beyond the main step-off pad are posted as a Fixed Contamination Area (FCA). Within the FCA are Radiological Buffer Areas (RBAs), Contamination Areas (CAs), High Contamination Areas (HCAs), and Airborne Radioactivity Areas (ARAs). Routine radiological surveys indicate that contamination is being maintained within the specified posting criteria.

371 Attic & 374 Mezzanine (400 level)

The Building 371 Attic is currently posted as an RBA. Very few releases/spills have reportedly occurred in this area of the building. However, a spill did occur in the May/June 2000 timeframe in this area during tap and drain activities. The area has been decontaminated to the extent practical and has been painted with fixative paint. Throughout the 2nd floor there are areas with equipment on the walls, floors, and in the overheads that are labeled as internally contaminated.

The majority of the Building 374 Mezzanine is currently posted as an RBA, with a small CA located in the laboratory area. Releases of radiological material have reportedly occurred in the past in this area. These have generally been tied to work activities associated with the various filter plenum and ventilation systems.

Survey areas covering the B371 Attic and the B374 Mezzanine include Survey Areas Q, R, S, X and Y.

371/374 Ground Floor (300 level)

The ground floor of Building 371 contains RBAs, CAs, HCAs, ARAs, as well as radiologically uncontrolled office and support areas. Building 374 contains RBAs and CAs, and the operational area has been posted as an ARA several times. Releases have reportedly occurred in nearly all major process related areas of the main floor of both buildings. The survey areas for this level of the buildings include Survey Areas I, J, K, L, M, N, O, V and W. Excluded from RLC survey are Rooms 3325, 3333, 3303, 3547,3559, 3551, 3553, 3555, 3559, 3563, 3521, 3523, 3025, 3529, 3531, 3517, 3571, 3573, 3202, 3204A and 3561A due to current ARA or HCA status. Additional surveys will be required in these areas during In Process Characterization or Pre Demolition Survey.

371/374 Basement (200 level)

The survey areas for this level of the building include Survey Areas C, D, E, F, G, H, T and U. Rooms 2317, 2319, 2323, 2327, 2341, as well as Stacker-Retriever areas were excluded from RLC due to current ARA or HCA status. Additional surveys will be

required in these areas during In Process Characterization or Pre Demolition Survey. Rooms 2325 and 2307 have both had air reversals and/or contamination events occur within them since characterization has been performed. One contamination event in Room 2325 was significant and resulted in contamination spread into the adjacent corridors. Contamination external to Room 2325 was decontaminated to RBA levels.

371 Sub-basement (100 level)

The survey areas for this level of the building include Survey Areas A, B and H. Included in these survey areas are Rooms 1115, 1113, 1103, 1111, 1210, 1214 and 1216; Stairwell # 5; and Corridors 1003, 1004, 1005 and 1006.

Rooms 1115 and 1103 are associated with the caustic waste systems and have a history of radiological releases. The floors in these rooms have been painted multiple times, indicating prior localized contamination events. Rooms 1105, 1117, 1119, 1125, 1109 and 1107 as well as the Stacker-Retriever areas were excluded from RLC due to current ARA or HCA status. Additional surveys will be required in these areas during In Process Characterization or Pre Demolition Survey. Corridors that surround the rooms at this level are posted as RBAs.

Building 373 (cooling tower), Building 374A (carpenter's shed), Building 377 (air compressor), Building 378 (pump house), Building 381 (fluorine storage)

The 371 Cluster ancillary buildings are not radiologically posted facilities/structures. No known historical radiological releases have occurred or been associated with these buildings. Radiological survey data are not available for these support facilities.

Exterior Tanks

The tanks exterior to Building 371 are not radiologically posted facilities/structures. The vapor effect tanks and the spray dryer could contain residual radioactivity due to their historical content. The other exterior tanks have never contained radioactive material. Radiological survey data are not available for these tanks.

3.2.2 Reconnaissance Level Characterization

In support of Reconnaissance Level Characterization, radiological conditions were evaluated in the 371/374 Building Cluster through the use of radiological surveys, scans and samples, as well as historical and process knowledge. Direct radiological surveys were performed on the interior and exterior of all buildings for alpha activity and beta removable activity and alpha total surface activity. Surface scans for alpha contamination were also performed on floors and walls <2 meters from the floor at each required total surface activity location. Paint samples for radiological analysis were taken on the interior and exterior of buildings. All paint samples were obtained from locations where contamination from spills and releases could have occurred (i.e., biased locations).

Twenty (20) concrete floor samples (2 inch plugs) were taken from random locations throughout B371 and B374. PRO-475-RSP-16.01, Radiological Survey/Sampling Package Design, Preparation, Control, Implementation and Closure, Table 1, RLC Survey/Sample Requirements was used as the basis to determine requirements. In all cases, the required number and type of measurements were exceeded.

Pre-Demolition Survey activities were performed on Building 371 Cluster Type 1 (Class 3) facilities. The interiors and exteriors of Buildings 373, 374A, 377, 378 and 381 were classified together as Survey Unit 371001 due to their small size and similar radiological histories. Total surface activity (TSA), removable activity, and surface scans were performed on the interior and exterior of all facilities for alpha and beta contamination per MARSSIM guidance. Surface scans were performed in areas where contamination would be expected to accumulate (i.e., high traffic areas on the floors, etc.). A minimum of 10% of the total area of the survey unit was scanned. Fifteen randomly selected TSA and removable activity measurements were taken in the survey unit. A systematic grid pattern was used for the 15 measurement points in accordance with MARSSIM requirements for Class 3 facilities. TSA and removable activity measurements were taken independently of surface scans to maximize the probability of finding contamination. Three of the 15 randomly selected TSA measurement locations were re-surveyed by an independent radiological control technician for quality control (QC) purposes.

Volumetric samples were also taken from B373 to determine if the facility had been contaminated by radiological operations. Two (2) biased sediment samples were taken from the concrete sump under the cooling tower, and four (4) bulk samples were taken from the Transite panels.

Background (gamma and neutron) radiation, due to co-located DOE source-term material located within some survey areas, results in elevated readings in the beta channel (and in some instances the alpha channel) of portable instrumentation. This radiation tends to appear as beta contamination during surface measurements. Therefore, beta measurements were not collected during RLC and will be taken after source-term materials throughout the cluster have been removed. This is not expected to impact waste estimates or hazard controls because limits for alpha emitters are typically exceeded far before those for beta emitters, and the probability of finding beta contamination without associated alpha contamination is improbable. Additionally, high interference background levels tend to skew the data towards false positives and indicate uncertainty in the presence of contamination. Beta surveys of surface structures are not routinely taken in the B371 Cluster.

Assessment of Radiological Surveys/Scans

Radiological survey and scan results were evaluated with respect to the potential for contamination being present. Survey and scan results were examined to determine if the data exceeded guidelines prescribed in DOE Order 5400.5. An initial material classification was then made based on the radiological posting for the areas and the

results of this assessment. In addition to the survey/scan data, the following assumptions were made when determining waste volume estimates:

1. All areas and their contents that are not radiologically posted or posted as Radiological Buffer Areas or Radioactive Material Areas are considered sanitary waste or candidates for unrestricted release.
2. All areas and their contents that are radiologically posted as a Contamination Area or Fixed Contamination Area are considered LLW.
3. All areas and their contents that are radiologically posted as a High Contamination Area or Airborne Radioactivity Area are considered LLW or transuranic (TRU) waste.

Assessment of Radiological Samples

Radiological sample results from painted surfaces were evaluated with respect to the potential for contamination being present. Sample results were examined to determine if data exceeded guidelines prescribed in DOE Order 5400.5. An initial material classification for the specific media sampled was made based upon the sample results and the following assumptions:

1. If all paint samples from a survey area contain radioactive material below the unrestricted release limits prescribed in DOE Order 5400.5, the associated material is considered a sanitary waste candidate for unrestricted release.
2. If any paint sample from a survey area contains radioactive material above the unrestricted release limits prescribed in DOE Order 5400.5, the associated material is considered LLW.

Radiological sample results from B371 and B374 concrete floors, and B373 transite panels and sump sediment were evaluated with respect to the potential for contamination being present. Sample results were examined to determine if data exceeded the limits prescribed in DOE Order 5400.5. An initial material classification for the specific media sampled was made based upon the sample results and the following assumptions:

1. If all samples from a specific media type (i.e., concrete, transite or sediment) contain radioactive material below the unrestricted release limits prescribed in DOE Order 5400.5, the associated material is considered a sanitary waste candidate for unrestricted release.
2. If any sample from a specific media type contains radioactive material above the unrestricted release limits prescribed in DOE Order 5400.5, the associated material is considered LLW.

Exclusions from RLC Surveys

In accordance with PRO-475-RSP-16.01, certain areas were excluded from RLC surveys due to their radiological posting. These include areas posted as High Contamination Areas (HCAs) or Airborne Radioactivity Areas (ARAs), and areas secured for security purposes. Additional surveys will be required in these areas during In Process Characterization or Pre-Demolition Survey. By virtue of their current

radiological posting, the following areas within the Building 371/374 complex have been excluded from RLC surveys:

- Rooms directly associated with the Stacker-Retriever (Room 1220) of B371;
- Rooms 1125, 1117, 1119 and 1105 on the Sub-basement level of B371;
- Rooms 2317, 2319, 2323, 2327 and 2339 on the basement level of B371; and
- Rooms 3325, 3333, 3303, 3202, 3559, 3561A, 3563, 3549, 3551, 3553, 3547, 3555, 3521, 3525, 3529, 3531, 3523, 3573, 3571 and 3517 on the main floor level of B371.

All areas excluded from surveys/scans and sampling, however, are included in the overall hazards characterization presented in Section 4.0 and in the basis for facility classification presented in Section 7.0.

3.2.3 Sampling and Field Measurement Methods, Procedures and Equipment

Radiological surveys, including surface scans, swipes, and media samples, were taken per the requirements of the *RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, November 1999, Revision 0.* All radiological surveys were taken in accordance with the requirements in Procedure 3-PRO-165-RSP-07.02, "Contamination Monitoring Requirements." All radiological samples were taken in accordance with Analytical Services Division (ASD) requirements and PRO-477-RSP-16.03, "Radiological Samples of Building Media". All field measurements and sampling were performed in accordance with the DDCP and the PDSP.

3.2.4 Laboratory Analysis

Radiological samples were analyzed per the requirements of the *RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, November 1999, Revision 0.* All radiological samples were analyzed in accordance with Site requirements (refer to Section 6.1.3).

3.3 Chemical Characterization

Chemical characterization was performed to determine the nature and extent of chemical hazards, including chemical contamination, that may be present in the 371/374 Building Cluster. Characterization was based on a review of historical and process knowledge, historical data, and new data generated during RLC. This section discusses the historical data on these facilities and RLC activities undertaken. All characterization data and related hazards are discussed in Section 4.0, summarized by SET and/or facility. Historical and RLC data are presented in the RLC project file.

3.3.1 Summary of Historical Information

Limited historical data exist on chemical hazards and contamination of Site buildings. The RFETS Historical Release Report discusses past building operations and releases to the environment. This document and discussions with building personnel on historical and process knowledge were used to identify potential chemicals and areas of

concern, to determine what historical information can be used to make RLC decisions, and to identify what additional information is required. The following contaminants were considered when determining sampling and analysis needs:

- lead (Pb) and other RCRA toxic metals;
- volatile and semi-volatile organic compounds (VOCs/SVOCs);
- beryllium (Be);
- PCBs; and
- asbestos.

All chemicals used were considered in summarizing hazards in Section 4.0 and classifying facilities in Section 7.0.

Paints in some buildings were previously evaluated for lead by *in-situ* X-ray fluorescence, and some buildings were sampled to identify asbestos-containing material (ACM). All older transformers were also previously tested for PCB-containing oils. In addition, most buildings where beryllium was used or stored in the past have undergone limited assessment for industrial hygiene purposes.

Historical information on the 371/374 Building Cluster are summarized below and in Table 3-3. Entries of "indeterminate" indicate that additional information was needed to be collected during RLC. Hazards identified based on historical and RLC information are presented in Section 4.0.

Table 3-3 Summary of Historical Data

Building	Above Decision Rule (Release Limit)?				
	Pb/Metals[2]	VOC/SVOC	Beryllium	PCBs[1&2]	Asbestos
371	Below	Below	Below	Below	***Above***
373 Cooling Tower	Indeterminate	Below	Below	Below	Indeterminate
374 Waste Treatment	Below	Below	Below	Below	***Above***
374A Carpenter Shop	Below	Below	Below	Below	Indeterminate
377 Air Compres-sor	Below	Below	Below	Below	Indeterminate
378 Pump House	Below	Below	Below	Below	Indeterminate
381 Fluorine Bldg.	Below	Below	Below	Below	Indeterminate

Footnotes are presented on next page.

1 PCB-containing ballasts may exist in the lighting systems of buildings that contain fluorescent lights. Also, some equipment in B371 and B374 may contain PCB oils, although not likely based on the age of the buildings.
2 Debris containing metals or PCBs in paint may be managed as non-hazardous (solid) waste as long as it is not scabbled or otherwise made to constitute a separate waste stream.

3.3.1.1 Lead (Pb) and Other Metals in Paint

Limited analyses for Pb in paint on walls, tanks, and other surfaces were performed on Building 371 and 374 using a Niton portable X-ray fluorescence unit. These results show low levels of lead in paint in these buildings (refer to Table 3-4).

No further characterization for lead or other metals in paint was conducted. Environmental Waste Compliance Guidance #27, *Lead-based Paint (LBP) and Lead-based Paint Debris Disposal*, states that LBP debris generated outside of currently identified high contamination areas shall be managed as non-hazardous (solid) wastes and need not be characterized unless the potentially lead-containing component is to be scabbled or otherwise comprise a separate waste stream. Hence, the data in Table 3-4 are presented primarily for Occupational Safety and Industrial Hygiene use in planning PPE and respiratory protection for scabbling operations.

Table 3-4 Lead in Paint from B-371 and B-374

Sample Number	Bldg. No.	Location	Total lead level per unit surface area by *in-situ* X-ray fluorescence (mg/100 cm^2)
371-97/10/28-23-03	371	Stairwell 4, sub-basement	0.38
371-97/10/28-23-02	371	Stairwell 4, sub-basement	0.06
371-97/10/05-23-05	371	Rm. 2310, pipe, 371 effluent sampler	0.01
371-97/10/28-23-04	371	Rm. 4202, 371 effluent sampler	0.05
371-97/11/28-23-03	371	Rm. 2213, pipe, east side, 371 effluent sampler	0.01
371-97/10/28-23-02	371	Rm. 3537A, pipe #2, 371 effluent sampler	0.02
371-97/10/05-23-06	371	Rm. 3537A, effluent sampler	0.02
371-97/01/14-23-02	371	Hallway 2001, south wall	0.01
371-97/09/16-54-07	371	Rm. 2310, east fire wall	0.00
371-97/09/16-54-08	371	Rm. 2310, north fire wall	0.02
371-97/09/16-54-01	371	Rm. 2310, west fire wall	0.02
371-97/09/16-54-10	371	Rm. 2310, north fire wall	0.1
371-97/09/16-54-06	371	Rm. 2310, east fire wall	0.05
371-97/09/16-54-05	371	Rm. 2223A, east fire wall	0.02
371-97/09/16-54-04	371	Rm. 2207, south fire wall	0.01
371-97/09/16-54-03	371	Rm. 2213, east fire wall	0.03
371-97/09/16-54-02	371	Rm. 2213, south fire wall	0.12
371-97/09/16-54-09	371	Rm. 2310, west fire wall	0.03
371-97/09/22-54-09	371	Rm. 3206, door frame	0.01
371-97/09/22-54-13	371	Rm. 3206, door frame	0.01
371-97/10/22-54-12	371	Rm. 3206, door frame	0.1
371-97/10/22-54-08	371	Wall entering Rm. 2335C	0.06

371-97/10/22-54-10	371	Rm. 3206, door frame	0.01
371-97/10/22-54-05	371	Outside Rm. 2307 facing east	0.02
371-97/10/22-54-11	371	Rm. 3206, door frame	0.16
371-97/10/22-54-03	371	Rm. 2307, east wall	0
371-97/10/22-54-02	371	Rm. 2307, west wall	0.03
371-97/10/22-54-01	371	Rm. 2307, south wall	0.01
371-97/10/22-54-04	371	Rm. 2307, east wall	0
371-97/10/22-54-06	371	Outside Rm. 2307, facing north	0.01
371-97/10/22-54-07	371	Rm. 4102, north wall	0.38
371-97/11/03-23-04	371	Stairway 4, sub-basement	0.02
371-97/11/03-23-01	371	Stairway 4, sub-basement	0.01
371-97/11/03-23-02	371	Stairway 4, sub-basement	0.03
371-97/11/03-23-03	371	Stairway 4, sub-basement	0
371-97/11/07-23-02	371	Rm. 3187B, yellow handrail around battery station #32	0.01
371-97/11/07-23-01	371	Rm. 3187B, Dock 18T, emergency tape on floor	20
371-97/11/26-23-03	371	Fire door from dock 5T	0.01
371-97/11/26-23-01	371	Fire doors between Rm. 4101 and Stairway 6	0
371-97/11/26-23-02	371	Fire door from Dock 5T	0.04
371-97/11/22-23-03 through -05; 371-97/11/22-23-06 through -13	371	Multiple samples, Rm. 2310, exhaust duct support FP 142	0 (All)
371-97/12/23-23-01	371	Paint on electric control panels, Rm. 3541	0.1
371-97/12/23-23-02	371	Paint on electric control panels, Rm. 3541	0
371-97/12/26-54-08	371	Wall entering Rm. 2335C	0.06
371-97/12/26-54-02	371	Rm. 2307, west wall (*unpainted* block wall was analyzed)	0.03
371-97/12/26-54-07	371	Rm. 4102, north wall trigger valve	0.38
371-97/12/26-54-03	371	Rm. 2307, east wall	0
371-97/12/26-54-05	371	Outside of Rm. 2307, facing east	0.02
371-97/12/26-54-01	371	Rm. 2307, south wall (*unpainted* block wall was analyzed)	0.01
371-98/01/14-23-08	371	Hallway 2001, north wall	0.06
371-98/01/14-23-07	371	Hallway 2001, north wall	0.13
371-98/01/14-23-02	371	Hallway 2001, south wall (*drywall* was analyzed)	0.01
371-98/01/14-23-06	371	Hallway 2001, west wall	0.01
371-98/01/14-23-05	371	Hallway 2001, west wall	0.01
371-98/01/14-23-04	371	Hallway 2001, south wall	0.01
371-98/01/14-23-03	371	Hallway 2001, south wall	0.01
371-98/01/14-23-01	371	Hallway 2001, south wall	0.03
371-98/01/14-23-09	371	Hallway 2001, east wall	0
371-98/02/04-23-07	371	Rm. 3810, northeast wall	0
371-98/10/28-54-01	371	Rm. 2310, duct from FP243	0.2
371-98/12/08-23-43 through -49	371	Multiple samples, steel metal hanger in Rm. 3713	0 (All)
371-99/01/12-99-05	371	Rm. 1004, east window #7	0
371-99/01/14-23-04	371	Rm. 1004, east window left side	0
371-99/01/14-23-15	371	Breathing air drop 48 on west end of B371	0
371-99/01/12-99-03	371	Rm. 1004, east window bottom	0
371-99/01/12-99-10	374	North side of B374 breathing air drop #36	0
371-99/01/12-99-02	371	Rm. 1005, south window, left side	0
371-99/01/12-99-01	371	Rm. 1005, south window, bottom	0
371-99/01/12-99-07	374	Chiller tank 224 (north side of B374)	0.1

371-99/01/12-99-08	374	Spray dryer, north side	0
371-99/01/12-99-09	374	Spray dryer, east column	0.1
371-99/01/12-99-06	371	Rm. 3583, diesel storage tank	0
371-99/01/12-99-11	371	North central roof exhaust grille	0
371-99/01/12-99-12	371	West roof exhaust grille	0
371-99/01/12-99-14	371	Permanent ladder, west side of B371	0.3
371-99/01/12-99-13	371	Center roof exhaust grille	0
374-97/05/27-23-01	374	Rm. 4810, effluent sampler	0.005
374-97/11/26-23-04	374	Fire doors between Hallway 2001 and Stairway 6	0.08
374-97/11/26-23-05	374	Fire doors, ground floor, Stairway 6	0
374-98/02/04-23-06	374	Rm. 2804, north wall over door	0
374-98/02/04-23-04	374	Rm. 3805, west wall	0
374-98/02/04-23-05	374	Rm. 3801, south wall over door	0
374-98/02/04-23-01	374	Stepoff pad	0.01
374-98/02/04-23-02	374	Stepoff pad	3.6
374-98/02/04-23-03	374	Rm. 2804, north wall	0.05

3.3.1.2 PCBs

No records of PCB sampling within Cluster facilities were readily available. If any PCB oils had been released from a transformer or other piece of equipment in the past, such oils would have been cleaned up pursuant to standards applicable to those times, probably without any documentation. All older transformers were reportedly tested for PCB-containing oils. Any PCB-containing oils were flushed and replaced with non-PCB oils.

3.3.1.3 Beryllium

Some beryllium repack operations took place in B371 from November 1998 through February 1999, but were restricted to Rooms 3412 and 3541, and consisted only of cleaning, unpacking and repackaging beryllium-clad pits. A total of 172 surface swipes (post-job surveys) were collected from predetermined locations in these rooms, and all results were below the 0.2 $\mu g/100\ cm^2$ limit. Additionally, the results of 30 breathing zone air samples collected on 15 separate days during this period were less than the regulatory OSHA limit for beryllium of 0.002 mg/m^3 and the RFETS airborne action level of 0.0005 mg/m^3. These reports are included in the RLC project file.

Additionally, the RFETS Chronic Beryllium Disease Prevention Program (CBDPP) conducted beryllium surveys of B371 Rooms 3412 and 3206 in June 1999. These rooms are listed in the List of Known Beryllium Areas (LKBA) as sites of beryllium-containing equipment use or of site-return and non-destructive assay of potentially beryllium-containing materials. All results were below the 0.1 $\mu g/100\ cm^2$ detection limit. The numbers of smears and their locations are given in Table 3-5.

Rooms 3809 and 3810 of B374 are also listed on the LKBA. In October 1998, RFETS CBDPP conducted surveys of these rooms. All results were below the 0.1 $\mu g/100\ cm^2$ detection limit. The numbers of smears and their locations are given in Table 3-5.

3.3.1.4 Asbestos

Limited asbestos inspections and sampling were previously conducted in B371 and B374, each of which contains asbestos material. A summary of the asbestos data is provided in Table 3-6, and individual sample locations are described in Table 3-7.

Table 3-5 Historical Beryllium Characterization of B371/374 Cluster

Sample Numbers	Bldg.	Number of Samples	Locations	Analytical Results (µg/100 cm^2)	Above Decision Rule (0.2 µg/100 cm^2)
371-06301999-35-001 through -038	371	38	Control panels, glovebox external surfaces and ports, vents, floor, cabinet top, eyewash, oxygen analyzer, computer and printer consoles, steel steps, portable downdraft unit, fire extinguisher.	< 0.1	Below
371-06301999-35-039 through -058	371	20	Floors, chair, drum, desk top, glovebox external surface, X-ray equipment, fire phone.	< 0.1	Below
374-981015-3809-01 through – 25 & 374-981021-35-26 through -42	374	42	Floor, pumps, pedestal, tank brace, air pump, desk top, shelf, drawer, ledge, pallet jack top, pipe, drum, vent, transfomer top.	< 0.1	Below
374-981021-35-01, 374-981021-35-03 through -20	374	19	Conduit, J box, floor, bypass valves, diaphragm pump case, tool chest, tank.	< 0.1	Below

Table 3-6 Summary of Historical Asbestos Data

Type of Material	Asbestos Above/Below Decision Rule?	No. of Samples Collected	Comments
Transite	***Above***	4	B373 panels consist of 35% and 20% Chrysotile
Concrete Walls	Below	6	Negative results
Pipe Insulation	***Above***	25	All pipe insulation samples have been negative with the exception of 6 samples collected from Rm. 3155, 2 samples from Rm. 2310 steam ejector lines, 1 sample collected from pipe insulated Rm. 2014; 5% and 8% (two different layers)
Glovebox Glue	***Above***	1	3% Chrysotile
Acoustic Ceiling Tile	Below	7	Negative results
Concrete Floor	Below	2	Negative results
Wallboard	Below	6	Negative results

Floor Tile	***Above***	6	15% in black backing (SOE Control Rm.), 3-4% on the tile, and 8% on the brown adhesive backing material
Roofing Material	***Above***	4	4 layer of material; 1 of 4 samples were positive for Chrysotile (55%)
Carpet glue	Below	1	Negative results
374 Tank Coating	***Above***	3	All layers of coatings were negative, except the brown/silver resinous material with white fibrous woven material (Chrysotile)
Packing Gland Gasket	***Above***	1	Packing gland gasket material, 70% Chrysotile
Safe Insulation	Below	2	Insulation for 2 safes in Bldg. 371
Furnace Insulation	***Above***	2	1 insulation material for 2 furnaces stored in Rm. 3706 hard top & bottom plates 2 cementous insulation
Floor Sweeping	Below	1	Greenish fibrous material, texture similar to steel wool
		Total = 71	

Table 3-7 Summary of Asbestos Sample Locations Above Decision Rule

Sample ID No.	Sample Location Bldg./Room	Type of Material	Asbestos Above Decision Rule?	Comments
374-95-12-20-23-01	374/Door 9T	Transite	***Above***	35% Chrysotile, gray plaster with white paint
374-95-12-20-23-02	374/Door 13T	Transite	***Above***	35% Chrysotile, gray plaster with yellow & white paint
371-96-02-19-23-16	371/3148	Glovebox Glue	***Above***	3% Chrysotile, brown/silver resinous material
371-96-05-28-23-74	371/3155	Paint on Insulation	***Above***	4% Chrysotile, white paint ext.with wh fibrous int.
371-96-05-30-23-76	371/3155	Paint on Insulation	***Above***	8% Chrysotile
371-96-05-30-23-78	371/3155	Paint on Insulation	***Above***	15% Chrysotile
371-96-05-30-23-79	371/3155	Paint on Insulation	***Above***	15% Chrysotile
371-96-05-30-23-80	371/3155	Paint on Insulation	***Above***	15% Chrysotile, trace levels of Anthophyllite
371-96-05-30-23-81	371/3155	Paint on Insulation	***Above***	10% Chrysotile
371-96-08-08-23-88	371/3107	Floor Tile	***Above***	8% tar, 4% in tile, both Chrysotile, tan/white
371-95-11-20-01-1	371 main entrance	Floor Tile	***Above***	3% Chrysotile, tan/white tile
371-95-11-20-01-2	371 main entrance	Floor Tile	***Above***	3% Chrysotile, tan/white tile
371-95-11-20-01-3	371 main entrance	Floor Tile	***Above***	3% Chrysotile, tan/white tile
371-97-02-24-54-04	48 wand 9' sth of door	Roofing Material	***Above***	Black fibrous tar like material; 55% Chrysotile

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	from str.26			
371-97-05-20-23-01	371/2107	Floor Tile	***Above***	15% in black tar of the floor tile
JA Jones # 11/249700 1371	371/2310	Pipe Insulation	***Above***	5% Chrysotile in white fibrous woven material covered with white resinous paint – steam injectors
JA Jones # 112497002 371	371/2310	Pipe Insulation	***Above***	10% Chrysotile – white resinous paint; steam injectors
374-98-03-23-23-01	Tanks north of B374 (outside) T804	TSI	***Above***	3 layers of material; first is gray paint, next layer cement like white material and then cloth mesh
374-98-03-23-23-02	Tanks north of B374 (outside) T803	TSI	***Above*** (outer layer)	3 layers of material; first is gray paint, next layer cement like white material and then cloth mesh outer gray paint with mesh contained
374-98-03-23-23-03	Tanks north of B374 (outside) T802	TSI	***Above*** (outer layer)	3 layers of material; first is gray paint, next layer cement like white material and then cloth mesh outer gray paint with mesh contained asbestos
371-98-09-10-23-01	371/3206	Fiberboard	***Above***	Compressed fiberboard insulation for furnaces, gray fibrous Plaster (25%)
371-98-10-23-01	371/2014	TSI	***Above***	5 % on white resinous substrate chrysotile
373-99-05-05-23-01	373	Cooling Tower Slash guards	***Above***	Gray cement like material
371-97-03-17-54-01	373 Cooling Tower	Corrugated Transite Panel	**Above**	Hard gray cement material with black paint exterior

3.3.2 Reconnaissance Level Characterization

Historical and process knowledge for each of the facilities were reviewed based upon the following potential contaminants of concern: metals, volatile and semi-volatile organic chemicals, beryllium, PCBs, and asbestos. RLC data were collected only in those instances in which data gaps were identified.

Solutions containing RCRA toxic metals were handled stored or treated throughout B371 and B374. Therefore, randomly located concrete samples were collected from floors and analyzed for RCRA toxicity characteristics. Historical and process knowledge also indicates the use of a hexavalent chromium-containing fungicide/algicide in the B373 cooling tower make-up water. Beryllium sampling was conducted at previously unsampled locations in several rooms within B371 and B374 that were either listed on the List of Known Beryllium Areas, or were sites of waste processing for which historical data indicated the possibility of beryllium-containing materials being present. Several buildings contain suspected asbestos-containing material, and were inspected and sampled accordingly.

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3.3.2.1 Toxic Metals

Discussions with building personnel indicated that many spills had taken place in B374. Specific spill locations were unable to isolated based on these interviews and site walkdowns. Additionally, the floors have been re-painted in many general areas, making specific spill locations hard to isolate. As a result, multiple locations were selected on a random basis over all working floors of both Buildings 374 and 371 to acquire volumetric concrete samples for metal and radiochemical analysis. Because of the unknown spatial distribution of potential contamination, locations were chosen at random using a grid and random number generator.

Historical and process knowledge indicates the use of a hexavalent chromium-containing fungicide/algicide in the B373 cooling tower make-up water. The slats of the cooling tower itself are composed primarily of transite board, and this was sampled for RCRA toxic metals as part of RLC, as was sediment residing within the concrete catchment (sump) beneath the towers.

No further characterization for lead or other toxic metals in paint was conducted. Environmental Waste Compliance Guidance #27, *Lead-based Paint (LBP) and Lead-based Paint Debris Disposal*, states that LBP debris generated outside of currently identified high contamination areas shall be managed as non-hazardous (solid) wastes and need not be sampled unless the potentially lead-containing component is to be scabbled or otherwise comprise a separate waste stream.

3.3.2.2 VOCs/SVOCs

Historical and process knowledge indicate that there was very limited use and handling of VOCs/SVOCs in the 371 Cluster buildings. Additionally, given the vapor pressure of compounds such as trichloroethylene and carbon tetrachloride, it is likely that spills of such materials would have evaporated rather than persisted to the present time. Therefore, VOC/SVOC analysis was unnecessary and was not conducted.

3.3.2.3 Beryllium

Historical data and process knowledge indicate the use and storage of beryllium and beryllium-containing materials at various locations in B371 and B374. For RLC, sampling of B371 Rooms 3206, 3412 and 3541 was conducted at locations above 6 feet, including above ceiling tiles. These rooms had previously been sampled (refer to Section 3.3.1.3), but the specific RLC locations had not been previously sampled. Further, sampling of locations above and below six feet was conducted in B374 areas where waste processing occurred.

3.3.2.4 PCBs

Based on process and historical knowledge and building walkdowns, no PCB sampling of surface media was conducted nor warranted during RLC. There are no potential PCB sites located within the Cluster facilities.

The presence of small amounts of specialized paints or coatings associated with PCBs in the B-371/374 cluster buildings cannot be ruled out. However, even if such paints or coatings were present, Environmental Waste Compliance Guidance #25, *Management of Polychlorinated Biphenyls (PCBs) in Paint and Other Bulk Product Waste During Facility Disposition*, states that applied dried paints, varnishes, waxes, or other similar coatings or sealants are acceptable for disposal (with notification) in a non-hazardous solid waste landfill as PCB Bulk Product Waste under 40 CFR 761.3 and 40 CFR 761.62 paragraph (b), and therefore, need not be sampled as long as restrictions outlined in 40 CFR 761.62 regarding their disposal are met.

3.3.2.5 Asbestos

Based on historical use of asbestos in various building materials, some asbestos sampling was conducted during RLC. Buildings 371 and 374 had previously undergone a limited inspection for asbestos. However, numerous data gaps were identified, and additional sampling of roofing material was conducted as part of RLC. Additionally, all other buildings in the cluster required full asbestos inspections.

3.3.3 Sampling and Field Measurement Methods, Procedures, and Equipment

3.3.3.1 RCRA Toxic Metals

For determination of RCRA metal concentrations in concrete and transite in B371, B373, and B374, samples were collected utilizing a Hilte impact tool (for concrete) or broken off with a pair of pliers (transite) as described in Sections 5.1.2 and 5.5.2, respectively, of the Reconnaissance Level Characterization Plan (RLCP).

3.3.3.2 Beryllium

For determination of surface beryllium contamination in Buildings 371 and 374, judgment samples consisting of smears of 100 cm^2 areas were taken using Whatman 41 filter papers as described in Section 5.3.2 of the RLCP.

3.3.3.3 Asbestos

For determination of asbestos in building materials, samples of materials were taken using a Wondermaker™, razor knife, or similar appropriate sampling tool as described in Section 5.5.2 of the RLCP.

3.3.4 Laboratory Analysis

3.3.4.1 RCRA Toxic Metals

Samples were analyzed by EPA SW-846 Method 1311 (Toxicity Characteristic Leaching Procedure) and Method 6010B (Inductively Coupled Plasma Atomic Emission Spectroscopy).

3.3.4.2 Beryllium

Samples were analyzed by EPA SW-846 Method 3051 (Microwave-assisted Acid Digestion) and OSHA Method ID-121 (Flame Atomic Absorption Spectroscopy).

3.3.4.3 Asbestos

All bulk samples collected during RLC were analyzed utilizing EPA 600/M4-82020, December 1982 (Interim Method for the Detection of Asbestos in Bulk Insulation Samples) by an NVLAP-accredited laboratory. The laboratory participates in both the NVLAP and the AIHA Bulk Asbestos Sampling Quality Assurance Programs.

4.0 FACILITY HAZARDS

Based on facility and process knowledge, operating and spill records, and survey and analytical data collected, radiological, chemical, and unique physical hazards were identified and are presented below by each B371 Cluster facility. Table 4-1 summarizes hazards by facility. Table 4-2 summarizes hazards within B371 and B374 by SET. These tables reflect contamination identified on building and equipment surfaces as well as possible contamination within equipment, gloveboxes, process lines, and plenums. Radiological contamination refers to building materials and equipment that contain radioactivity above surface contamination guidelines and volume contamination thresholds. In-process nuclear material and nuclear material holdup refer to nuclear material, in solution or as solid material, in equipment, gloveboxes, process lines, and plenums that can be recovered to a large extent. Other radioactive material refers to intact nuclear material that can be removed.

Table 4-1 B371/374 Cluster Hazards

FACILITY HAZARDS	371	373	374	374A	377	378	381	371/374 Exterior Tanks
Radiological Contamination	Yes[3]	No	Yes	No	No	No	No	Yes
In-Process Nuc. Material	Yes	No	Yes	No	No	No	No	No
Nuc. Material Holdup	Yes	No	Yes	No	No	No	No	No
Other Rad. Mat'l (sources & product)	Yes	No	Yes	No	No	No	No	No
Rad. Waste Storage	Yes	No	Yes	No	No	No	No	Yes
Chem./Haz. Waste Storage	Yes	No	Yes	No	No	No	Yes	Yes
Mixed Waste Storage	Yes	No	Yes	No	No	No	No	Yes
Chem. Product Storage	Yes	Yes	Yes	Yes	No	No	No	Yes
Asbestos	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead/Toxic Metals[1]	Yes	No	Yes	No	No	No	No	Yes
Beryllium	Yes	No	Yes	No	No	No	No	Yes
PCBs[2]	Yes	No	Yes	No	No	No	No	No
Other Chemical Hazards	Yes	No	Yes	No	No	No	No	Yes
Unique Physical Hazards	Yes	Yes	Yes	No	No	No	No	No

[1] Designation does not include metals that may be present in paint (e.g., lead-based paint).
[2] Designation does not include PCBs that may be present in fluorescent light ballasts and some paints.
[3] "Yes" is indicated when any part of the facility or any facility component (or any one of the exterior tanks) presents a hazard.
Buildings 373, 374A, 377, 378 and 381 represent SET 16, and the exterior tanks represent SET 14. SET 15, the office building (B376) and trailers (T371K, T371H/J and T376A), is not addressed in this RLCR.

Table 4-2 B371/B374 Hazards

EXTERIOR & SETS / HAZARDS	SET 1 371	SET 2 371	SET 3 371	SET 4 371	SET 5 371	SET 6 371	SET 7 374	SET 8 371	SET 9 371	SET 10 371	SET 11 371	SET 12 371	SET 13 371	371/374 Exterior[4]
Radiological Contamination	Yes[3]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
In-Process Nuc. Material	No	Yes	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No
Nuc. Material Holdup	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No
Other Rad. Mat'l (sources & product)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No
Rad. Waste/Residue Storage	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	No
Chem./Haz. Waste Storage	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Mixed Waste Storage	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Chem. Product Storage	Yes	No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	No
Asbestos	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead/Heavy Metals[1]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No
Beryllium	No	No	Yes	No	No	No	Yes	Yes	No	No	Yes	No	No	No
PCBs[2]	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Other Chemical Hazards	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	No
Unique Physical Hazards	No	No	No	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	No

[1] Designation does not include metals that may be present in paint (e.g., lead-based paint).
[2] Designation does not include PCBs that may be present in fluorescent light ballasts and some paints.
[3] "Yes" is indicated when any part of the SET or any component within the SET presents a hazard.
[4] No assigned SET.

Most of the radiological survey points were below the Minimum Detectable Concentration (MDC) of the instrument. Many of the survey points were above the MDC of the instrument but below the contamination limits for unrestricted release prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. There were a few points that were above the contamination limits for unrestricted release prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Estimates of radioactive contamination within the B371 Cluster, based on the DQOs, are presented below in Table 4-3 by survey area. The estimates only reflect contamination detected during the RLC surveys. Estimates do not include high contamination areas, airborne radioactivity areas, and other areas not surveyed because of known contamination. Also, estimates do not reflect RLC surface media sampling results. Therefore, the total amount of contaminated area may be greater than the total amount of contaminated area presented in Table 4-3. However, facility classification is not impacted by any under-estimation of area contamination

(classification per Table 4-5 is conservative). The total area of contamination is reflected in the *Building 371 Closure Project Waste Management Plan* (K-H 2000). Table 4-4 summarizes RLC surface media sampling results. RLC measurement and surface media sampling data are presented in the B371 Cluster RLC project file. Table 4-5 classifies the survey areas in accordance with MARSSIM, and recommends the facility type in accordance with the DPP. Radiological hazards are presented by SET or facility in Tables 4-7 through 4-26.

Table 4-3 Contamination Estimates of the B371 Cluster, Based on RLC Measurements, by Survey Area

SURVEY AREA	TOTAL NO. OF MEASURMENTS	NO. OF MEASUREMENTS INDICATING CONTAMINATION	GROSS ESTIMATE OF CONTAMINATED SURFACE AREA (square meters)	
	Remov.α/β and Total α	Remov.α/β and Total α	Floors & Walls (≤2 m high)	Walls (>2 m high)
PACKAGE ID: 99-0001				
A	459	55	450	50
B	549	21	50	10
C	543	7	50	10
D	770	6	50	0
E	373	17	120	15
F	265	0	0	0
G	146	0	0	0
H	624	0	0	0
I	163	14	869	300
J	200	30	200	40
K	320	6	100	0
L	260	3	20	0
M	526	2	80	0
N	325	0	0	0
O	413	3	6	3
P	318	11	400	0
Q	320	1	20	0

	TOTAL NO. OF MEASURMENTS	NO. OF MEASUREMENTS INDICATING CONTAMINATION	GROSS ESTIMATE OF CONTAMINATED SURFACE AREA (square meters)	
	Remov.α/β and Total α	Remov.α/β and Total α	Floors & Walls ($\leq$2 m high)	Walls (>2 m high)
R	320	8	120	0
S	200	0	0	0
T	324	87	400	100
U	400	0	0	0
V	200	46	350	200
W	400	25	300	50
X	200	32	150	30
Y	255	8	20	0
Z	135	9	0	N/A
AA	56	0	0	N/A
BB	64	6	0	0
CC	70	1	0	N/A
DD	170	0	0	0
EE	240	0	0	0
FF	151	0	0	0
GG	135	0	0	0

N/A = Not Applicable

Table 4-4 RLC Surface Media (Paint) Sampling Results by Survey Area

SURVEY AREA	TOTAL NO. OF SAMPLES	NO. OF SAMPLES INDICATING URANIUM CONTAMINATION	NO. OF SAMPLES INDICATING TRANSURANIC CONTAMINATION
A	5	0	3
B	3	0	1
C	3	0	0
D	3	0	1
E	5	0	0
F	2	0	0
G	3	0	0
I	4	0	0
J	5	0	1
K	4	0	0
L	3	0	0
T	2	0	2
V	3	1	3
W	2	0	1
X	1	0	1
Z	8	0	0
GG	3	0	0

Table 4-5 B371 Cluster Survey Area Classification

BUILDING	SET(s)	SURVEY AREA	FACILITY TYPE (Type 1, 2 or 3)*	SURVEY AREA CLASSIFICATION (Per MARRSIM; Non-impacted, Class 3, 2 or 1)**
371	4	A	3	1
	4, 12	B		1
	12, 13	C		2
	5, 12, 13	D		1
	5, 12	E		1
	12, 13	F		2
	12, 13	G		2
	9, 12	H		2
	3, 8	I		1
	2, 6, 8, 11, 12	J		1
	3, 8, 9, 11, 12, 13	K		1
	10, 11, 12	L		1
	9, 12	M		2
	9, 12	N		2
	9	O		2
	1, 12	P		1
	1, 12	Q		1
	1, 12	R		1
374	7, 12	S	2	1
	7	T		1
		U		1
		V		1
		W		1
		X		1
		Y		1
371/374 Exterior	No Assigned SET	Z	2	2
Tanks 170 & 262A	14	AA	1	3
Tanks 224 - 227		BB	2	2
Tanks 163 -165 & 262		CC	1	3
Tanks 167 -169 & 228		CC	2	2
373 Interior	16	DD	1	3
374A/377/ 381 Interior		EE	1	3
378 Interior		FF	1	3
373/374A/ 377/378/381 Exterior		GG	1	3

*Under the DPP, Type 1 facilities are considered "free of contamination;" Type 2 facilities contain no significant contamination or hazards, but are in need of decontamination; and Type 3 facilities contain significant radiological contamination and/or hazards.

**Under MARRSIM, (Section 4.4):
Non-impacted areas are areas where there is an no reasonable potential of residual contamination;

Class 3: areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the $DCGL_W$;
Class 2: areas with a potential for radioactive contamination, or known contamination, but are not expected to exceed the $DCGL_W$. These areas should provide a high degree of confidence that no individual measurement would exceed the $DCGL_W$;
Class 1: areas that have, or had prior to remediation, a potential for radioactive contamination, or known contamination. Note that areas containing contamination in excess of the $DCGL_W$ prior to remediation should be classified as Class 1 areas.

Residual amounts of toxic metals, organic solvents, and beryllium are present inside gloveboxes, process equipment and tanks, related piping, and plenums, including the vapor effect tanks and the spray dryer. Some equipment may contain PCB-contaminated oils. B371/374 also contains considerable amounts of lead shielding, and numerous gloveboxes, equipment and containers are lead lined. Asbestos-containing material is present in most of the cluster buildings in several forms (e.g., floor and ceiling tile, mastic, other building material, and insulation). Some buildings have fluorescent light ballasts containing PCBs. Chemical hazards are also associated with the presence of in-process nuclear material, and hazardous and mixed waste. The presence of these materials is presented by SET or facility in Tables 4-7 through 4-26. There are no other significant chemical hazards.

Physical hazards associated with the buildings consist of those common to standard industrial environments and include hazards associated with energized systems, utilities, gas cylinders, trips and falls, and forklift operations. Fall hazards are significant in the Central Storage Vault (i.e., Stacker-Retriever in SETs 4, 8 and 11). There are no unique hazards associated with the different facilities. The buildings have been relatively well maintained and are in good physical condition, and therefore, do not present hazards associated with building deterioration. Physical hazards are controlled by the Site Occupational Safety and Industrial Hygiene Program, which is based on OSHA regulations, DOE orders, and standard industry practices.

Note that some hazards can change before the facilities are dispositioned. Operations, including building deactivation, are still on going within the facilities. For example, types and quantities of hazardous materials and their locations may change. Also, levels of contamination in different areas may increase or decrease. However, in general, hazards are continuously reduced and will be significantly less prior to demolition. Hazard characterization will continue after RLC until completion of the Pre-Demolition Survey. In addition, isolation control will be instituted to ensure that uncontaminated and decontaminated areas remain free of contamination, especially Type 1 facilities that have already undergone PDS and have been declared eligible for unrestricted release.

4.1 Building 371/374

4.1.1 Radiological Hazards

Radiological survey results on the interior indicate that radiological hazards vary greatly (from minimal to extensive) depending upon the processes taking place in the specific survey area. During RLC, Survey Areas A, E, I, J, T, V, and X were posted as CAs. Survey Areas B, C, D, F, G, K, L, P, Q, R, S, U, W, and Y were posted as RBAs. Rooms

1105, 1117, 1119, 2317, 2319, 2323, 2327, 2339, 2341, 3325, 3325, 3333, 3303, 3547, 3559, 3551, 3553, 3555, 3559, 3563, 3521, 3523, 3025, 3529, 3531, 3517, 3571, 3573, 3202, 3204A, and 3561A as well as Stacker-Retriever areas were excluded from RLC due to current ARA or HCA status. Additional surveys will be required in these areas during In Process Characterization or Pre Demolition Survey. The RLC radiological surveys indicate that contamination is generally being maintained within the specified posting criteria, with a few exceptions.

All volumetric samples acquired – 20 concrete plugs, 2 inches deep and randomly located throughout all levels of the facilities (371/374) – indicate that radioactive contamination is limited to the surface of the concrete. All results were near detection limits (<1 pCi/g for each radionuclide of interest), which are roughly two to three orders of magnitude below RFCA Tier II Action Levels. RFCA Tier II Action Levels are the appropriate action levels for bulk, volumetric concrete measurements, as the ultimate disposition of the concrete will likely be an environmental medium (e.g., fill material).

Survey results on the exterior indicate occasional elevated fixed alpha radiation levels in areas with a high probability for radon daughter buildup. These areas will require isotopic sampling during Pre-Demolition Survey. During decommissioning activities such as equipment/material strip-out, radiological surveys of building surfaces and equipment will be needed to detect any radiological hazards that may be present under equipment or in areas that were not accessible during RLC.

Radiological hazards are also associated with the presence of in-process nuclear material, nuclear material holdup, other radioactive materials (e.g., containerized special nuclear material and calibration sources), and radioactive and mixed waste. The presence of these materials is presented by SET in Tables 4-7 through 4-26.

4.1.1.1 Survey Area A

This Survey Area is located in the sub-basement of Building 371, and includes CA posted Rooms 1115 & 1113, and CAs within Rooms 1103 and 1210. The total surface area of the Survey Area is 497 m^2.

Radiological survey and sample results indicate that radiological hazards are present. The Survey Area contains numerous radiologically contaminated tanks and gloveboxes and has a substantial spill history. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area A is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 70 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 29 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 34 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 81 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 29 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 34 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

34 of the 81 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall near Glovebox 22, which had an alpha total surface activity of 17,600 dpm/100 cm^2 and alpha removable activity of 281.4 dpm/100 cm^2, indicating fixed and removable contamination.

8 of the 30 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was on the floor near tank 400A. It had an alpha total surface activity of 17,700 dpm/100 cm^2 and alpha removable activity of 23.4 dpm/100 cm^2 indicating fixed and removable contamination.

4 of the 30 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall near tank 160A, which had an alpha total surface activity of 138,000 dpm/100 cm^2 and alpha removable activity of 336 dpm/100 cm^2 indicating fixed and removable contamination.

7 of the 29 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on tank 400A, which had an alpha total surface activity of 16,556 dpm/100 cm^2 and alpha removable activity of 71 dpm/100 cm^2 indicating fixed and removable contamination.

Some portions of Survey Area A were inaccessible, and this resulted in 6 planned equipment measurements and 4 planned > 2 meter wall or floor measurements not being performed. However, this eventuality had been anticipated and supplementary measurement locations were included in the planning. As a result, the radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2*. The following paint measurements were specified:

- 5 biased (paint) media samples.

The following measurements were collected:

- 5 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. Three of the five media sample results were above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for paint beneath a tank in Room 1115, which resulted in 39,581 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.2 Survey Area B

This Survey Area is located in the sub-basement of Building 371, and includes RBA posted Rooms and corridors 1103, 1101, 1111, 1006, 1005, 1004, 1003, Stairwell #5, 1216, 1210, 1208, 1121, 1121A, 1124, 1123, 1204, 1202, 1214, and Stairwell #1.

Radiological survey and sample results indicate that radiological hazards are present. The Survey Area contains radiologically contaminated tanks and gloveboxes and has a substantial spill history. Contamination was found on surfaces below two meters and equipment. One reading above two meters in Room 1103 also indicates a radiological hazard. Survey Area B is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 107 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 18 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 45 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 107 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 18 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 47 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

6 of the 107 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor of Room 1103, which had an alpha total surface activity of 534 dpm/100 cm^2 and alpha removable activity of 12 dpm/100 cm^2 indicating fixed contamination.

6 of the 18 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in

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DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was on the floor in Room 1121A. It had an alpha total surface activity of 720 dpm/100 cm^2 and alpha removable activity of 21 dpm/100 cm^2 indicating fixed and removable contamination.

1 of the 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall in Room 1103, which had an alpha total surface activity of 126 dpm/100 cm^2 and alpha removable activity of 0 dpm/100 cm^2 indicating fixed contamination.

8 of the 40 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a flange in Room 1103, which had an alpha total surface activity of 900 dpm/100 cm^2 and alpha removable activity of 0 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 4 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples. The planned sample in Room 1101 was not feasible due to the room being a secured vault with limited access. The survey package survey/sampling instructions provide for skipped sample locations.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. One of the three media sample results was above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for gray paint from the floor under pump 230B in Room 1210, which resulted in 135 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.3 Survey Area C

This Survey Area is located in the south basement of Building 371. This Survey Area is posted as an RBA and includes Rooms and corridors 2202, 2011, 2202A, 2202B, 2202C, 2205, and Stairwell #3.

Radiological survey results indicate that radiological hazards are present on surfaces above two meters, below two meters, and equipment. Various pieces of equipment within the Survey Area are posted as HCAs, ARAs, and CAs. Spills have occurred in the Survey Area. Survey Area C is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 75 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 65 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 81 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 65 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-

gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All but one of the 30 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. It had an alpha total surface activity of 178 dpm/100 cm^2 indicating fixed contamination.

2 of the 40 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall in Room 2202, which had an alpha total surface activity of 103 dpm/100 cm^2 indicating fixed contamination.

4 of the 65 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a vent in Room 2202C, which had an alpha total surface activity of 208 dpm/100 cm^2 and alpha removable activity of 3 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 3 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.4 Survey Area D

This Survey Area is located in the central basement of Building 371. This Survey Area is posted as an RBA and includes Rooms and corridors 2012, 2203, 2201, 2207, 2223, 2213, 2217, 2010 (corridor), 1216, Stairwell #5, 2221, 2225, and 2009 (corridor).

Radiological survey and sample results indicate that minimal radiological hazards are present. Various pieces of equipment within the Survey Area are posted as HCAs, ARAs and Cas, and the Survey area is adjacent to the 371 stacker/retriever. Spills have occurred in the Survey Area. Contamination was found on surfaces below two meters, and on equipment. Survey Area D is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 87 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 29 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 65 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 146 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 55 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 9 total surface activity measurements on the ceiling and walls > 2 meters from the floor with 29 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 59 total surface activity measurements on equipment with 70 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha

meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

Two of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 2223, which had an alpha total surface activity of 273 dpm/100 cm^2 indicating fixed contamination.

One of the biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 2203, which had an alpha total surface activity of 108 dpm/100 cm^2 indicating fixed contamination.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual

3 of the total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a pump in Room 2207, which had an alpha total surface activity of 131 dpm/100 cm^2 and alpha removable activity of 3 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded except in the >2m biased category. Additional surveys will be required in the >2m biased category during In Process Characterization or Pre Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 3 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. One of the three media sample results was above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for gray paint from the floor of Room 2223, which resulted in 256 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.5 Survey Area E

This Survey Area is located in the basement of Building 371. This Survey Area is posted as a CA and includes Rooms 2307 & 2325, and Stairwell #4.

Radiological survey results indicate that radiological hazards are present. Various pieces of equipment within the Survey Area are posted as HCAs. Spills have occurred in the Survey Area. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area E is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 42 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 49 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 45 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 42 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 26 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 total surface activity measurements on the ceiling and walls > 2 meters from the floor with 49 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 45 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

Two of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 2325, which had an alpha total surface activity of 1,417 dpm/100 cm^2 indicating fixed contamination.

Two of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 2307, which had an alpha total surface activity of 171 dpm/100 cm^2 indicating fixed contamination.

One of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a wall in Room 2325, which had alpha removable activity of 36 dpm/100 cm^2 indicating removable contamination.

12 of the total surface activity measurements on equipment and 1 swipe for removable alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a B-box in Room 2307, which had an alpha total surface activity of 1000 dpm/100 cm^2 and alpha removable activity of 33 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the*

Building 371 Cluster, Revision 0, Volumes 1 & 2. The following paint measurements were specified:

- 5 biased (paint) media samples.

The following measurements were collected:

- 5 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.6 Survey Area F

This Survey Area is located in the north west basement of Building 371. This Survey Area is posted as an RBA and includes Rooms 2305, 2301, 2309, 2303, 2304, 2306, & 2018; Stairwells #1 & #2; and Corridor 2014.

Radiological survey and sample results indicate that radiological hazards are not present. However, various pieces of internally contaminated equipment as well as waste storage drums are located within the Survey Area. Spills have occurred in the Survey Area. Survey Area F is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 60 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with 60 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 8 biased total surface activity measurements on the floor and walls < 2 meters from the floor with 20 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 9 total surface activity measurements on equipment with 60 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment and associated swipes for removable alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded except in the <2m biased and equipment biased categories. Additional surveys will be required in the <2m biased and equipment biased categories during In Process Characterization or Pre Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 2 biased (paint) media samples.

The following measurements were collected:

- 2 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.7 Survey Area G

This Survey Area is located in the central basement of Building and is adjacent to the 371 stacker/retriever. This Survey Area is posted as an RBA and includes Rooms 2310, 2316, 2321 & 2016; Corridor 2015; and a portion of Corridor 2009.

Radiological survey and sample results indicate that radiological hazards are not present. However, various pieces of internally contaminated equipment as well as waste storage drums are located within the Survey Area. Spills have occurred in the Survey Area. Survey Area G is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.

- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 15 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with 30 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 8 biased total surface activity measurements on the floor and walls < 2 meters from the floor with 10 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 10 total surface activity measurements on equipment with 30 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment and associated swipes for removable alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded except in the <2m unbiased, <2m biased, and equipment biased categories. Additional surveys will be required in the <2m unbiased, <2m biased, and equipment biased categories during In Process Characterization or Pre

Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 3 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.8 Survey Area H

This Survey Area is located in Building 371. It includes non-radiological rooms/offices at the east end of the basement, Rooms 1001 & 1002, Elevator #1, and Stairwell #6 in the sub-basement.

Radiological survey results indicate that radiological hazards are not present. Survey Area H is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 138 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 60 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.

- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 138 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 60 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 2 biased (paint) media samples.

The following measurements were collected:

- 0 biased (paint) media samples. The sample team was unable to locate or access Room 2103 or Room 2101. The survey package survey/sampling instructions provide for skipped sample locations.

Although no surface media samples were taken in this Survey Area, the requirements delineated in PRO-475-RSP-16.01 for this Survey Area were satisfied.

4.1.1.9 Survey Area I

This Survey Area is located in process areas and rooms at the west end of the main floor. This Survey Area is posted as a CA and includes Rooms 3305, 3323, 3321, 3335, 3329, 3206 & 3204. Areas excluded are rooms 3303, 3202, 3204A, 3339A, 3325, 3327, 3331, 3333, 3343A due to posting as HCA/ARA or being secured vaults. Additional surveys will be required in these areas during In Process Characterization or Pre Demolition Survey.

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area I is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 18 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with 30 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

- 7 biased total surface activity measurements on the floor and walls < 2 meters from the floor with 10 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 7 total surface activity measurements on the ceiling and walls > 2 meters from the floor with 10 associated swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 26 total surface activity measurements on equipment with 30 swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Two of the biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 3206, which had an alpha total surface activity of 285 dpm/100 cm^2 and alpha removable activity of 74 dpm/100 cm^2 indicating fixed and removable contamination.

Two of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall in Room 3206, which had an alpha total surface activity of 240 dpm/100 cm^2 indicating fixed contamination.

6 of the total surface activity measurements on equipment and 2 associated swipes for removable alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on an exhaust vent in Room 3305, which had an alpha total surface activity of 2,224 dpm/100 cm^2 and alpha removable activity of 1,240 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were not met in any category. Additional surveys will be required in the <2m unbiased, <2m biased, equipment biased, and >2m biased categories during In Process

Characterization or Pre Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 4 biased (paint) media samples.

The following measurements were collected:

- 4 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.10 Survey Area J

This Survey Area is located in process areas and rooms at the west end of the main floor. This Survey Area is posted as a CA and includes 3412, 3602, 3511, 3515, 3567A, 3545, 3543, 3557 & 3567B. Areas excluded are rooms 3559, 3575A, 3561A, 3563, 3549, 3551, 3553, 3547, 3555, 3565A, 3569A, 3573, 3571, 3517, 3531, 3529, 3523, 3025, and 3521 due to posting as HCA/ARA. Additional surveys will be required in these areas during In Process Characterization or Pre Demolition Survey.

Radiological survey and sample results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area J is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

Three of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 3515, which had an alpha total surface activity of 1,512 dpm/100 cm^2 indicating fixed contamination.

Two of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a wall in Room 3515, which had an alpha total surface activity of 186 dpm/100 cm^2 indicating fixed contamination.

One of the swipes for removable alpha activity on the ceiling and walls > 2 meters from the floor for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall in Room 3412, which had alpha removable activity of 42 dpm/100 cm^2 indicating removable contamination.

23 of the total surface activity measurements on equipment and 2 associated swipes for removable alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on top of Tank D-305H in Room 3515, which had an alpha total surface activity of 9,918 dpm/100 cm^2 and alpha removable activity of 81 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 5 biased (paint) media samples.

The following measurements were collected:

- 5 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. One of the three media sample results is above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for gray/purple paint from the floor of Room 3557, which resulted in 191 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.11 Survey Area K

This Survey Area is located in Rooms/corridors on main floor, including Corridors 3341, 3035, 3031A, 3034/3404A & 3033; Rooms 3337, 3037, 3537A, 3541, 3036, 3501, 3315, 3301, 3030, 3208, 3406, 3404, 3404B, 3402, 3408, 3436, 3412, 3513 & 3420; and Stairwells # 1, 2 & 3. All of these rooms are posted as RBAs. Excluded from this Survey Area is the CA of Room 3412 (included in Survey Area J).

Radiological survey results indicate that radiological hazards are present. Contamination was found on one piece of equipment. Survey Area K is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

One of the total surface activity measurements on equipment was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a laboratory sink in Room 3408, which had an alpha total surface activity of 19,980 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 7 biased (paint) media samples.

The following measurements were collected:

- 4 biased (paint) media samples. The planned sample in Room 3337 was not feasible due to the room being a secured vault with limited access. The planned sample in Room 3412 was a repeat in the instructions and had already been sampled as part of Survey Area J. Room 3420 was posted to exclude heat generating and spark creating work and therefore could not support the sampling methods used. The survey package survey/sampling instructions provide for skipped sample locations.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.12 Survey Area L

This Survey Area is located on main floor and includes Corridors 3031B, 3032, 3042, 3040, 3041; and Rooms 3434, 3432, 3432A, 3432B, 3430A, 3430, 3721, 3717, 3709, 3719, 3606, 3189, 3713, 3715 & 3701. All of these rooms are posted as RBAs.

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces below two meters and equipment. Survey Area L is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 40 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with 70 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with 20 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 20 total surface activity measurements on equipment with 30 swipes for removable alpha and beta-gamma activity. High gamma levels in the survey area from internally contaminated equipment and/or waste storage resulted in coincidence alpha meter readings (cross-talk) in excess of the maximum procedurally allowable alpha background and precluded more equipment readings.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Two of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the south wall cage area in Room 3145, which had an alpha total surface activity of 132 dpm/100 cm^2 indicating fixed contamination.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

One of the total surface activity measurements on equipment was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a floor drain in Corridor 3041, which had an alpha total surface activity of 1,080 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded except in the <2m biased category. Additional surveys will be required in the <2m biased category during In Process Characterization or Pre Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 5 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples. The planned sample in Room 3606 was not feasible due to the room being a secured vault with limited access. The sample team was unable to locate or access Room 3189. The survey package survey/sampling instructions provide for skipped sample locations.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.13 Survey Area M

This Survey Area is located on main floor of Building 371 and encompasses non-radiological rooms and administrative offices in the southwest area of the main floor level west of Corridor 3017A, including Corridor 3017A. None of these rooms are radiologically posted.

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces below two meters. Survey Area M is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 117 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 35 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 117 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity
- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 35 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

Two of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Corridor 3042, which had an alpha total surface activity of 738 dpm/100 cm^2 indicating fixed contamination.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.14 Survey Area N

This Survey Area is located on main floor of Building 371 and encompasses 31 non-radiological rooms and administrative offices in the southwest area of the main floor level east of Corridor 3017A, excluding Corridor 3017A. None of these rooms are radiologically posted.

Radiological survey results indicate that radiological hazards are not present. Survey Area N is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 62 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. Two survey locations were inaccessible due to carpeting.

- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.15 Survey Area O

This Survey Area is located on main floor of Building 371 and encompasses 36 non-radiological rooms and administrative offices in the north and east areas of the main floor level. This includes those Rooms north of Corridor 3023 (Rooms 3038, 3583, 3581, 3044, 3587, 3043 & 3585). Excluded from this Survey Area are Rooms 3168, 3168A, and 3168B due to being posted as a CA (included in Survey Area W).

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters. Survey Area O is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 72 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 46 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 72 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. Two survey locations were inaccessible due to carpeting.
- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 46 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

Two of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. Both readings were taken in Room 3585. The maximum value was for a location on the floor in Room 3585, which had an alpha total surface activity of 276 dpm/100 cm^2 indicating fixed contamination.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

One of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a

location on the south wall in Room 3585, which had an alpha total surface activity of 216 dpm/100 cm^2 indicating fixed contamination.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.16 Survey Area P

This Survey Area is located in the Building 371 attic and encompasses the north end of Room 4301 and Stairway #2. This Survey Area is posted as an RBA.

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces below two meters and equipment. Survey Area P is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with 19 swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity. One smear point was not taken due to very high total surface activity, which may have caused an airborne contamination event if disturbed.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with 29 swipes for removable alpha and beta-gamma activity. One smear point was not taken due to very high total surface activity, which may have caused an airborne contamination event if disturbed.

Five of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor and two swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 4301, which had an alpha total surface activity of 2,976 dpm/100 cm^2 and an alpha removable activity of 45 dpm/100 cm^2 indicating fixed and removable contamination.

Five of the biased total surface activity measurements on the floor and walls < 2 meters from the floor and one swipe for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 4301 under a Solu-Meter valve, which had an alpha total surface activity of 60,000 dpm/100 cm^2. No swipe was taken for alpha removable activity at this location due to this very high total surface activity, which may have caused an airborne contamination event if disturbed.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

One of the total surface activity measurements on equipment was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a floor drain in Corridor 3041, which had an alpha total surface activity of 6,000 dpm/100 cm^2 and an alpha removable activity of 204 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded except in the equipment-biased category. Additional surveys will be required in the equipment-biased category during In Process Characterization or Pre Demolition Survey after the interfering source material has been removed. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.17 Survey Area Q

This Survey Area is located in the Building 371 attic and includes Rooms 4303, 4305, 4307, the south end of 4301, and Stairway #1. This Survey Area is posted as an RBA.

Radiological survey results indicate that minimal radiological hazards are present. Contamination was found on one surface below two meters. Survey Area Q is contaminated, although the majority of the Survey Area yielded no elevated readings.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

One of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 4301, which had an alpha total surface activity of 102 dpm/100 cm^2 indicating fixed contamination.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.18 Survey Area R

This Survey Area is located in the Building 371 attic and includes Rooms 4202, 4204, 4003, 4004, and Stairway #3. This Survey Area is posted as an RBA.

Radiological survey results indicate that radiological hazards are present. Contamination was found on surfaces below two meters and equipment. Survey Area R is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.

- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

One of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the floor in Room 4202, which had an alpha total surface activity of 540 dpm/100 cm^2 indicating fixed contamination.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Seven of the total surface activity measurements on equipment were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a process water line in Room 4202, which had an alpha total surface activity of 456 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.19 Survey Area S

This Survey Area is located in the Building 371 attic and includes Rooms 4101, 4102, 4103, 4104, 4105, 4106, and Stairways #6 and #7. This Survey Area is not posted as a radiological area with the exception of Room 4104, which is posted as an RBA.

Radiological survey results indicate that radiological hazards are not present. Survey Area S is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-

gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.20 Survey Area T

This Survey Area is located in the Building 374 high bay. It encompasses Room 2804 including the stairwell. This Survey Area is posted as a CA.

Radiological survey and sample results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area T is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 35 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 43 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 30 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

Four of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor and four swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the stairway, which had an alpha total surface activity of 528 dpm/100 cm^2 indicating fixed contamination.

Fourteen of the biased total surface activity measurements on the floor and walls < 2 meters from the floor and eleven swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the south wall between tanks D-804A and D-804B, which had an alpha total surface activity of 3,222 dpm/100 cm^2 and an alpha removable activity of 29 dpm/100 cm^2 indicating fixed and removable contamination.

Ten of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the north wall between tanks D-802A and D-802B, which had an alpha total surface activity of 456 dpm/100 cm^2 indicating fixed contamination.

All but one of the total surface activity measurements on equipment were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on ventilation exhaust #4, which had an alpha total surface activity of 14,304 dpm/100 cm^2 and an alpha removable activity of 235 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 2 biased (paint) media samples.

The following measurements were collected:

- 2 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. Both of the two media sample results were above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for paint near a floor drain in Room 2804, which resulted in 11,333 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.21 Survey Area U

This Survey Area is located in the Building 374 basement and includes Rooms 2801, 2805, 2807, 2808, 2811, 2812, and Stairwell #8. This Survey Area is posted as a RBA.

Radiological survey results indicate that radiological hazards are not present. Survey Area U is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.

- 60 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 60 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.22 Survey Area V

This Survey Area is located in the Building 374 ground floor and includes Rooms 3801 and 3803. This Survey Area is posted as a CA.

Radiological survey and sample results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area V is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

Four of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor and one swipe for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location a wall behind tank D-816, which had an alpha total surface activity of 1,992 dpm/100 cm^2 and an alpha removable activity of 42 dpm/100 cm^2 indicating fixed and removable contamination.

One of the biased total surface activity measurements on the floor and walls < 2 meters from the floor and one swipe for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a floor drain between tanks D-819 and D-826B, which had an alpha total surface activity of 690 dpm/100 cm^2 indicating fixed contamination.

Five of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity and four swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall behind tank T-807, which had an alpha total surface activity of 534 dpm/100 cm^2 and an alpha removable activity of 36 dpm/100 cm^2 indicating fixed and removable contamination.

All but four of the total surface activity measurements on equipment were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on Glovebox GB-107, which had alpha fixed activity of 7,470 dpm/100 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2*. The following paint measurements were specified:

- 3 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples.

One of the media sample results was above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. Three of the three media sample results were above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for paint near a floor drain in Room 3803, which resulted in 6,446 dpm/100cm^2 total uranium activity (U-233/234 plus U-235 plus U-238) and 15,837 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.23 Survey Area W

This Survey Area is located in the Building 374 ground floor and includes Rooms 3802, 3804, 3805, 3806, 3807, 3808, 3809, 3810, 3811, 3812, 3813 (including downward Stairwell #8), 3168 and 3168A. This Survey Area is posted as a RBA.

Radiological survey and sample results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area W is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 60 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 60 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 20 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 60 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

Two of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a

location on the floor of Room 3168A, which had an alpha total surface activity of 4536 dpm/100 cm^2 indicating fixed contamination.

Four of the biased total surface activity measurements on the floor and walls < 2 meters from the floor were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the north wall of Room 3168A, which had an alpha total surface activity of 312 dpm/100 cm^2 indicating fixed contamination.

Three of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the north wall, which had an alpha total surface activity of 132 dpm/100 cm^2 indicating fixed contamination.

Sixteen of the total surface activity measurements on equipment for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on Pump 819, which had an alpha total surface activity of 420 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 2 biased (paint) media samples.

The following measurements were collected:

- 2 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. One of the two media sample results were above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for paint below tanks/equipment with a history of spill/leaks in Room 3809, which resulted in 3,891 dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

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The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.24 Survey Area X

This Survey Area is located in the Building 374 mezzanine and includes Rooms 4803, 4804, 4805, 4806, 4807, 4815, and Stairwell #9. This Survey Area is posted as a CA.

Radiological survey and sample results indicate that radiological hazards are present. Contamination was found on surfaces above two meters and below two meters, and on equipment. Survey Area X is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

Three of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor and two swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location the wall near

Glovebox GB120, which had an alpha total surface activity of 792 dpm/100 cm^2 and an alpha removable activity of 66 dpm/100 cm^2 indicating fixed and removable contamination.

Two of the biased total surface activity measurements on the floor and walls < 2 meters from the floor and one swipe for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a floor drain near Glovebox GB120, which had an alpha total surface activity of 636 dpm/100 cm^2 indicating fixed contamination.

One of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the wall near Glovebox GB120, which had an alpha total surface activity of 138 dpm/100 cm^2 indicating fixed contamination.

Nineteen of the total surface activity measurements on equipment for alpha activity and four swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. . The maximum value was for a location on a pump motor, which had an alpha total surface activity of 4,032 dpm/100 cm^2 and an alpha removable activity of 24 dpm/100 cm^2 indicating fixed and removable contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 1 biased (paint) media sample.

The following measurements were collected:

- 1 biased (paint) media sample.

None of the media sample results were above the contamination limits for uranium prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. One of the media sample results was above the contamination limits for transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum result was for paint at the floor drain in Room 4805, which resulted in 299

dpm/100cm^2 total transuranic activity (Am-241 plus Pu-239/241). The paint on the floors is contaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.1.25 Survey Area Y

This Survey Area is located in the Building 374 mezzanine and includes Rooms 4801, 4802, 4810, 4812, and 4814 (including stairway). This Survey Area is posted as a RBA.

Radiological survey results indicate that radiological hazards are present. Contamination was found on equipment. Survey Area Y is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 25 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and

beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Eight of the total surface activity measurements on equipment for alpha activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. . The maximum value was for a location on a gauge associated with D-832, which had an alpha total surface activity of 408 dpm/100 cm^2 indicating fixed contamination.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.1.1.26 Survey Area Z

This Survey Area consists of the Building 371 and Building 374 external surfaces and roofs. This Survey Area is not radiologically posted. However, some of the soil used as backfill reportedly came from the B707 vicinity and may have been contaminated. This contamination could have contaminated the building foundation and will be investigated in the future (e.g., when IHSSs, PACs, and UBCs are investigated).

Radiological survey results indicate that radiological hazards are present. Survey Area Z is contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 15 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the exterior walls and roof with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 15 biased total surface activity measurements on the exterior walls and roof with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

Six of the (unbiased) total surface activity measurements on the exterior walls and roof were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a metal cover on the eastern portion of the 371/374 roof, which had an alpha total surface activity of 522 dpm/100 cm^2 indicating fixed contamination. However, it is possible that these gross alpha readings are due in whole or in part to radon decay products. Oxidized exterior surfaces are known to trap radon decay products. The issue will be investigated during in-process characterization and the pre-demolition survey.

Three of the biased total surface activity measurements on the exterior walls and roof were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on a rain down spout on a south-facing wall just west of the 371/374 main entrance, which had an alpha total surface activity of 156 dpm/100 cm^2 indicating fixed contamination. However, it is possible that these gross alpha readings are due in whole or in part to radon decay products. Oxidized exterior surfaces are known to trap radon decay products. The issue will be investigated during in-process characterization and the pre-demolition survey.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 8 biased (paint) media samples.

The following measurements were collected:

- 8 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the roof is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.1.2 Chemical Hazards

Past and present asbestos sampling shows a significant amount of ACM throughout the building (e.g., in floor and ceiling tile, mastic, other building material, and insulation; refer to the RLC project file). Residual amounts of metals, organic solvents, beryllium and/or PCBs also may be present inside gloveboxes, process equipment and tanks, related piping, and plenums, including the vapor effect tanks and the spray dryer. In addition, B371 contains considerable amounts of lead shielding, and numerous gloveboxes, equipment and containers are lead lined.

B371/374 has some fluorescent light ballasts containing PCBs. Also, a specialized paint associated with PCBs was applied to radiologically contaminated areas within B371. This paint is purple in color (although it is referred to by building personnel as the "magenta paint").

Surface smears for beryllium contamination were conducted at a total of 36 individual locations within B371/374, and none of these samples were determined to have greater than 0.1 $\mu g/100\ cm^2$ beryllium (refer to the RLC project file).

Concrete floor samples were taken at 20 randomly selected locations within B371 and B374, and results were all below the maximum concentrations for toxicity characteristics. Therefore, the floor material would not constitute hazardous waste if converted to rubble. Historical data also show that lead and other RCRA metals are detectable in paint, but this does not preclude disposal of the building debris as non-hazardous (solid) wastes as long as the paint does not constitute its own waste stream.

Chemical hazards associated with B371/374 are summarized in Table 4-6. In addition to the hazards presented in the table, chemicals are stored in several locations, and include paints, sealants, caulks, adhesives, petroleum products, antifreeze/coolant, solvents, and cleaners. Hazardous and mixed wastes are also stored in numerous locations.

4.1.2.1 Lead and Other RCRA Metals

Metals might have been present in process releases that occurred throughout the facility and might have resulted in metal contamination. Therefore, concrete samples

were taken from process areas around the systems where leaks occurred. Results from 23 samples (20 real and 3 QC), randomly located throughout all floors (levels) of the Buildings 371 and 374, indicate the concrete is below the thresholds for toxicity characteristics, and therefore, does not constitute a hazardous waste (6 CCR 1007-3, Part 261). Results are in the RLC project file.

B371 also contains considerable amounts of lead shielding, and numerous gloveboxes, equipment and containers are lead lined. For example, the chainveyors have lead-lined cans. The pallets on the stacker-retriever also are lead-lined.

Historical data exist for analyses for lead and other metals in paint in Building 371/374 and its associated cluster buildings. However, Environmental Waste Compliance Guidance #27, *Lead-based Paint (LBP) and Lead-based Paint Debris Disposal*, states that LBP debris generated outside of currently identified high contamination areas shall be managed as non-hazardous (solid) wastes and need not be sampled unless the potentially lead-containing component is to be scabbled or otherwise comprise a separate waste stream. *Therefore, these historical lead analyses are most applicable to scabbling operations or to situations where OS&IH must determine respiratory safeguards where paint is to be removed and can potentially become airborne.*

Table 4-6 Summary of Building 371/374 Chemical Hazards[1]

Hazard	Analysis	Historical or RLC?	Above Decision Rule?
Pb/Metals	TCLP and total metals for paint	Historical	Below (unless segregated; see Section 4.1.2.1)
	TCLP for B371/B374 concrete	RLC	Below
	TCLP for B373 transite panel and basin sediment	RLC	Below
VOC/SVOC	None required	NA	NA
Beryllium	Surface smears	Historical and RLC	Below
PCBs	Leaking transformer on east side of rooftop, and soil in area beneath (Remediated)	Historical	Below
	Some fluorescent light ballasts with PCBs		**Above[2]**
Asbestos	Inspection; sampling of transite, floor tile, pipe insulation, elbows, and fittings	Historical and RLC	**Above**

Footnotes are presented on next page.

[1] Does not include internally contaminated gloveboxes, equipment, piping, plenums, and other systems.
[2] Fluorescent light ballasts must be removed prior to building demolition and disposed of as described in Environmental Waste Compliance Guidance #26, *Fluorescent Light Ballasts.*
NA = no analysis was performed.

4.1.2.2 VOCs/SVOCs

Tetrachloroethylene and carbon tetrachloride storage tanks and process lines exist throughout B371/374, but all of these systems have been drained. However, since these systems have not been flushed, it is expected that residual amounts of their original contents exist within the systems.

Residual contamination could be present inside gloveboxes and process equipment. Chemical hazards also are associated with in-process nuclear material, and hazardous and mixed waste.

Historical spills/releases on building surfaces (e.g., floors) have for the most part been cleaned up. No evidence of spills involving VOC or SVOC was observed on floors during the walkdown inspection. It is expected that, due to the vapor pressure of these chemicals, spills on floors not cleaned up would have evaporated. However, residuals from spills in some gloveboxes remain (in SETs 2 and 3).

4.1.2.3 Beryllium

Historical data discussed in Section 3.3.1.3 of this report show that no samples were found to contain beryllium above the detectable limit of 0.1 $\mu g/100cm^2$. However, data gaps were identified. Therefore, as part of RLC, surface smears for beryllium contamination were conducted at a total of 36 individual locations within the rooms of B371 that were suspected of containing beryllium contamination, and none of these locations were determined to have greater than 0.1 $\mu g/100\ cm^2$ beryllium (refer to RLC project file).

- Additionally, historical data and process knowledge show that *internal* beryllium contamination exists in several of the B371 gloveboxes and equipment, B371/374 tanks, and B371/374 piping and plenums.

4.1.2.4 PCBs

Approximately 1.08 yd^3 of soil was removed immediately north of transformer 371-2 (on the north side of B371) using hand shovels in late August, 1995. This site had previously been designated PCB-33, and is referred to as such in the *Closeout Report for the Source Removal of Polychlorinated Biphenyls, RF/RMRS-97-044, Rev. 0, July 1997.* Destructive concrete verification sampling showed no other PCB contamination, and the PCB-33 site was confirmed at <10 ppm PCBs by weight in the soil using EPA Method 8080 (refer to the RLC project file).

Some equipment in B371 and B374, including hydraulic equipment, may contain PCB-contaminated oils. The buildings also contain some fluorescent light ballasts containing

PCBs. Contamination of building surfaces from leaking ballasts is unlikely.

In addition, a specialized paint associated with PCBs was applied to radiologically contaminated areas within B371. This paint is purple in color (although it is referred to by building personnel as the "magenta paint"). According to Environmental Waste Compliance Guidance #25, *Management of Polychlorinated Biphenyls (PCBs) in Paint and Other Bulk Product Waste During Facility Disposition*, applied dried paints, varnishes, waxes, or other similar coatings or sealants are acceptable for disposal (with notification) in a non-hazardous solid waste landfill as PCB Bulk Product Waste under 40 CFR 761.3 and 40 CFR 761.62 paragraph (b), and therefore, need not be sampled as long as restrictions outlined in 40 CFR 761.62 regarding their disposal are met. If this paint is to be scabbled, OS&IH must determine precautions to be taken during the scabbling operation. Also, the scabble waste stream must be managed pursuant to all applicable regulations.

4.1.2.5 Asbestos

The total estimate for asbestos containing material B371/374 is:

Roofing material	112,054 square feet
Floor tile and mastic	5,225 square feet
Pipe insulation	225 linear feet
Asbestos-cement wainscoting on B374 walls	1,500 square feet
Transite panels	6,000 square feet

Some equipment also may contain asbestos lining, as well as fire doors. Based on historical surveys, ceiling tiles within B371 and B374 do not contain asbestos. Based on the type of carpeting within B371, asbestos is not suspected within carpeting.

4.1.3 Hazards Summary

B371/374 hazards are summarized in Tables 4-7 through 4-20.

Table 4-7 Hazards Within B371/374, SET 1

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal; floors, walls <2 m from the floor, and some equipment. The process chill water return system is internally contaminated.
In-Process Nuc. Material	None
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	None
Rad. Waste/ Residue Storage	None
Chem./Haz. Waste Storage	**Yes**
Mixed Waste	None

Storage	
Chem. Product Storage	**Yes**
Asbestos	**Yes**
Lead/Heavy Metals	None. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts may contain PCBs. Analysis of PCB in paint not required unless paint is removed from substrate.
Other Chem. Hazards	None
Unique Physical Hazards	None

Table 4-8 Hazards Within B371/374, SET 2

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal contamination on floors and walls; extensive contamination on equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCB in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	None.

Table 4-9 Hazards Within B371/374, SET 3

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal; floors, walls and equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	Some Be may be present in gloveboxes, equipment, piping and ventilation system.
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	None

Table 4-10 Hazards Within B371/374, SET 4

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; extensive; floors, walls and equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product	**Yes**

Storage	
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	**Yes**, inert vault and height of vault (fall hazard).

Table 4-11 Hazards Within B371/374, SET 5

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal contamination on floors and walls; more extensive contamination on equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	None
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	None

Table 4-12 Hazards Within B371/374, SET 6

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal contamination on floors and walls; extensive contamination on equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	None
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	**Yes**, ladders/fall hazards.

Table 4-13 Hazards Within B371/374, SET 7

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; variable, from extensive (Survey Area T) to uncontaminated (Survey Area U). Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product	**Yes**

Storage	
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	Be may be present in tanks, piping and plenums.
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	**Yes**, ladders/fall hazards.

Table 4-14 Hazards Within B371/374, SET 8

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal contamination on floors and walls; more extensive contamination on equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	**Yes**
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	Some Be may be present in gloveboxes, equipment, piping and ventilation system.
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	None

Table 4-15 Hazards Within B371/374, SET 9

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal; floors, walls <2 m from the floor, and some equipment.
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste/ Residue Storage	None
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	**Yes**
Asbestos	**Yes**
Lead/Heavy Metals	None. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	None
Unique Physical Hazards	None

Table 4-16 Hazards Within B371/374, SET 10

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal; floors, walls <2 m from the floor, and equipment. Some equipment and systems are also internally contaminated.
In-Process Nuc. Material	No
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	**Yes**
Asbestos	**Yes**
Lead/Heavy Metals	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping. Some gloveboxes, equipment and containers are lead lined,

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	and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	PCBs may be present inside some equipment. Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	Residual contamination may be present inside gloveboxes, process equipment and tanks, and related piping.
Unique Physical Hazards	**Yes**, fall hazards.

Table 4-17 Hazards Within B371/374, SET 11

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal contamination on floors and walls; more extensive contamination on equipment. One glovebox is also internally contaminated.
In-Process Nuc. Material	**Yes**
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	**Yes**
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	Some equipment and containers are lead lined, and lead shielding may be present. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	Some Be may be present in gloveboxes, equipment, piping and ventilation system.
PCBs	Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	None
Unique Physical Hazards	**Yes**, fall hazards.

Table 4-18 Hazards Within B371/374, SET 12

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; on some corridor floors and walls .
In-Process Nuc. Material	None
Nuc. Material	None

Holdup	
Other Rad. Mat'l (sources & product)	None
Rad. Waste/ Residue Storage	**Yes**
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	**Yes**
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	None. Analysis of lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	None
Unique Physical Hazards	None

Table 4-19 Hazards Within B371/374, SET 13

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; minimal; floors, walls and equipment. Ventilation system is also internally contaminated.
In-Process Nuc. Material	None
Nuc. Material Holdup	**Yes (see Section 2.2.3)**
Other Rad. Mat'l (sources & product)	None
Rad. Waste/ Residue Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	**Yes**
Asbestos	**Yes**
Lead/Heavy Metals	None. Analysis for lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts may contain PCBs. Analysis of PCBs in paint not required unless paint is removed from substrate.
Other Chem. Hazards	None
Unique Physical Hazards	None

Table 4-20 Hazards on B371/374 Roof and Exterior Walls (No Assigned SET)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	**Yes**; on roof and exterior walls. It is possible that the exterior elevated alpha readings are due in whole or in part to radon decay products.
In-Process Nuc. Material	Not applicable.
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste/ Residue Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**
Lead/Heavy Metals	None. Analysis for lead in paint not required unless paint is removed from substrate.
Beryllium	None
PCBs	None
Other Chem. Hazards	None
Unique Physical Hazards	None

4.2 Building 373

4.2.1 Radiological Hazards

Survey Area DD, Survey Unit 371001

This Survey Area consists of the Building 373 interior. This includes the cooling tower and pump house. This Survey Area is not radiologically posted.
Radiological survey results indicate that radiological hazards are not present. Survey Area DD is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity. The ceiling was not accessible.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. Based on the wall results and process knowledge, the ceiling is assumed to be below the contamination limits. Note that the ceiling also will be surveyed during demolition.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Survey Areas DD, EE, FF, and GG make up Survey Unit 371001. Based on the PDSP, 14 random locations were surveyed for alpha total surface activity, beta-gamma total surface activity, alpha removable activity, and beta-gamma removable activity. All measurements were below the applicable $DCGL_W$.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples of the cooling tower sediment were collected per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological*

Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2. The following samples were specified:

- 2 biased volumetric samples of Bldg 373 (cooling tower) sediment.

The following measurements were collected:

- 2 biased volumetric samples of Bldg 373 (cooling tower) sediment.

In addition, four (4) bulk samples (3 real and 1 QC) were acquired from the transite panels on the exterior walls of the structure. Sediment and transite samples were acquired to determine whether B373 had been impacted by radiological operations. Sample locations were established based on accessibility and visual observations to ensure representativeness of the water cooling process (e.g., wet, weathered panels or sediment accumulation). All bulk samples (6 total) yielded results at or near minimum detectable activities (typically less than 1 pCi/g) for each isotope of interest. Because the media of interest are porous and will most likely be wasted, a comparison of results with RFCA Action Levels is appropriate as an initial characterization of the materials. The sample results were roughly two to three orders of magnitude below RFCA Tier II Action Levels, for each radionuclide of interest, hence, the materials are not contaminated. Further, historical cooling operations do not appear to have been impacted by radiological operations.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.2.2 Chemical Hazards

The exterior of B373 cooling tower and pump house contains transite (asbestos) panels. However, RLC sampling and analysis results indicate that the transite and the cooling tower basin sediment are not contaminated with hexavalent chromium, which was used as a biocide in the cooling tower makeup water. PCBs are also present in some fluorescent light ballasts. No other chemicals are known or suspected of having been used and/or released within B373 and contaminated building surfaces.

4.2.2.1 Chromium and Other RCRA Metals (Including Lead)

Hexavalent chromium was a component of a biocide used to treat cooling tower make-up water, and could have contaminated most of the structure. Four (4) bulk samples were acquired from the transite panels on the exterior walls of the structure, and two (2) sediment samples were acquired from concrete sump below (the cooling towers). Samples locations were established based on accessibility and visual observations to ensure representativeness of the water cooling process (e.g., wet, weathered panels or sediment accumulation). However, sampling and analysis results indicate no (toxicity characteristic) metals contamination based on TCLP/metals analyses performed on

both the transite panels (4 samples total) and sediment (2 samples) residing in the concrete sump.

Based on cooling tower operations, no other RCRA metals are suspected of having been used in B373 or contaminated the structure.

4.2.2.2 VOCs/SVOCs

Based on cooling tower operations, no VOCs/SVOCs are suspected of having been used in B373 or contaminated the structure.

4.2.2.3 Beryllium

Based on cooling tower operations, no beryllium is suspected of having been used in B373 or contaminated the structure.

4.2.2.4 PCBs

Based on cooling tower operations, no PCBs are suspected of having been used in B373 or contaminated the structure. The pump house contains fluorescent light ballasts.

4.2.2.5 Asbestos

Asbestos is present throughout the cooling tower as transite panel. It is also found as pipe lining within the pump house. See facility inspection report in the RLC project file.

4.2.3 Hazards Summary

The hazards of B373 include asbestos, mostly associated with transite, and hexavalent chromium coatings on the some of the transite. Table 4-21 summarizes B373 hazards.

Table 4-21 B373 Hazards (part of SET 16)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	None
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None

Chem. Product Storage	None
Asbestos	**Yes**: Transite panel and thermal systems insulation.
Lead/Heavy Metals	None. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts contain PCBs.
Other Chem. Hazards	None
Unique Physical Hazards	None

4.3 Building 374A

4.3.1 Radiological Hazards

Survey Area EE, Survey Unit 371001

This Survey Area includes the interiors of Building 377 (air compressor bldg.), Building 381 (fluorine storage/paint shop), and Building 374A (carpenter shop). This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are not present. Survey Area EE is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

- 10 biased total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the biased total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Survey Areas DD, EE, FF, and GG make up Survey Unit 371001. Based on the PDSP, 14 random locations were surveyed for alpha total surface activity, beta-gamma total surface activity, alpha removable activity, and beta-gamma removable activity. All measurements were below the applicable $DCGL_W$.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

Survey Area GG, Survey Unit 371001

This Survey Area consists of roofs and exterior surfaces of Building 377, Building 378, Building 381, Building 374A, and Building 373. This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are not present. Survey Area GG is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

The following measurements were performed and documented:

- 35 random/uniform (unbiased) total surface activity measurements with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

All of the (unbiased) total surface activity measurements for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The roof of B374A and the top of the B373 pump house were not accessible at the time of the RLC/PDS. However, based on results on the other exterior surfaces within the survey area, the roof of B374A and the top of the B373 pump house are considered to be below the contamination limits. In addition, the B374A roof is made of wood, and does not contain any oxidized metal that could contain radon decay products. Note that the roof of B374A and the top of the B373 pump house will be surveyed during demolition.

With the exception of the two areas not surveyed (see preceding paragraph), the radiological survey requirements for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 3 biased (paint) media samples.

The following measurements were collected:

- 3 biased (paint) media samples.

None of the media sample results were above the contamination limits for uranium or transuranics prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The paint on the floors is uncontaminated.

The radiological sample requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological sample results are included in the RLC project file.

4.3.2 Chemical Hazards

B374A is the Carpenter Shop. The chemical hazards suspected are asbestos-containing siding, insulation and tiles, and PCBs in fluorescent light ballasts.

4.3.2.1 Lead and Other RCRA Metals

No evidence of lead contamination was identified during the facility walkdown, and no metal shavings were observed on the floor. Based on process knowledge, no other RCRA toxic metals are suspected of having been used in the facility and contaminated the structure.

4.3.2.2 VOCs/SVOCs

Even though solvents may have been present in the building in the past, no evidence of VOC/SVOC contamination was identified during the facility walkdown.

4.3.2.3 Beryllium

Based on process knowledge, no beryllium is suspected of having been used in the facility and contaminated the structure.

4.3.2.4 PCBs

PCB is present in fluorescent light ballasts. Based on process knowledge, no other PCBs are suspected of having been used in the facility and contaminated the structure.

4.3.2.5 Asbestos

Facility inspection found Transite panel used as building siding. Asbestos is also present in thermal insulation, ceiling tiles and flooring.

4.3.3 Hazards Summary

Table 4-22 summarizes B374A hazards.

Table 4-22 B374A Hazards (part of SET 16)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	None
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**: Transite paneling, ceiling and floor tile, and thermal systems insulation.
Lead/Heavy Metals	None. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts contain PCBs.
Other Chem. Hazards	None
Unique Physical Hazards	None

4.4 Building 377

4.4.1 Radiological Hazards

Radiological Surveys

See Section 4.3.1

4.4.2 Chemical Hazards

Asbestos is present in transite panels, thermal insulation, and floor and ceiling tiles, and PCBs are present in some fluorescent light ballasts. No other chemical hazard are present in B377 (Air Compressor Building).

4.4.2.1 Lead and Other RCRA Metals

Based on process knowledge, no RCRA metals are suspected of having been used in the facility and contaminated the structure.

4.4.2.2 VOCs/SVOCs

Based on process knowledge, no VOCs/SVOCs are suspected of having been used in the facility and contaminated the structure.

4.4.2.3 Beryllium

Based on process knowledge, no beryllium is suspected of having been used in the facility and contaminated the structure.

4.4.2.4 PCBs

Based on facility inspection and process knowledge, the only PCBs within B377 are associated with fluorescent light ballasts. No other PCBs are suspected of having been used in the facility and contaminated the structure.

4.4.2.5 Asbestos

Facility inspection found asbestos in B377 in the form of transite panels, thermal insulation, and floor and ceiling tiles.

4.4.3 Hazards Summary

Table 4-23 summarizes B377 hazards.

Table 4-23 B377 Hazards (part of SET 16)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	None
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**: Transite paneling, ceiling and floor tile, thermal systems insulation.
Lead/Heavy Metals	None. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts contain PCBs.
Other Chem. Hazards	None
Unique Physical Hazards	None

4.5 Building 378

4.5.1 Radiological Hazards

Survey Area FF, Survey Unit 371001

This Survey Area consists of the interior of Building 378 (waste collection pump house). This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are not present. Survey Area FF is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 22 random/uniform (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity and 15 1 m^2 surface scans for alpha activity. The total interior surface area of Building 378 is only ~15 m^2, and the number of random/uniform (unbiased) total surface activity measurements and 1 m^2 surface scans was reduced accordingly.
- 10 total surface activity measurements on the ceiling and walls > 2 meters from the floor with associated swipes for removable alpha and beta-gamma activity.
- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

All of the (unbiased) total surface activity measurements on the floor and walls < 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on the ceiling and walls > 2 meters from the floor for alpha activity with associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

Survey Areas DD, EE, FF, and GG make up Survey Unit 371001. Based on the PDSP, 14 random locations were surveyed for alpha total surface activity, beta-gamma total surface activity, alpha removable activity, and beta-gamma removable activity. All measurements were below the applicable $DCGL_W$.
The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

Radiological samples were performed per the specifications of IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2.* The following paint measurements were specified:

- 1 biased (paint) media sample.

The following measurements were collected:

- 0 biased (paint) media samples. Building 378 is a steel shed, the interior of which is not coated with a material suitable for sampling. The survey package survey/sampling instructions provide for skipped sample locations.

Although no surface media samples were taken in this Survey Area, the requirements delineated in PRO-475-RSP-16.01 for this Survey Area were satisfied.

4.5.2 Chemical Hazards

B378 is the pump house north of B374. No chemical hazards, except asbestos and PCBs in fluorescent light ballasts, were identified in the structure. The structure contains two raw water tanks and associated pumps, and they were never used.

4.5.2.1 Lead and Other RCRA Metals

Based on process knowledge, no RCRA metals are suspected of having been used in the facility and contaminated the structure.

4.5.2.2 VOCs/SVOCs

Based on process knowledge, no VOCs/SVOCs are suspected of having been used in the facility and contaminated the structure.

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4.5.2.3 Beryllium

Based on process knowledge, no beryllium is suspected of having been used in the facility and contaminated the structure.

4.5.2.4 PCBs

The only PCBs within B378 are in association fluorescent light ballasts. Based on process knowledge, no other PCBs are suspected of having been used in the facility and contaminated the structure.

4.5.2.5 Asbestos

Based on facility inspection, asbestos is present in thermal insulation.

4.5.3 Hazards Summary

Table 4-24 summarizes B378 hazards.

Table 4-24 B378 Hazards (part of SET 16)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	None
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**: thermal systems insulation.
Lead/Heavy Metals	None. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts contain PCBs.
Other Chem. Hazards	None
Unique Physical Hazards	None

4.6 Building 381

4.6.1 Radiological Hazards

Radiological Surveys

See Section 4.3.1

4.6.2 Chemical Hazards

The only hazard identified within B381 is asbestos and PCBs in fluorescent light ballasts.

4.6.2.1 Lead and Other RCRA Metals

Based on process knowledge, no RCRA metals are suspected of having been used in the facility and contaminated the structure. Lead-based paints may have been stored in the building, but no evidence of contamination was identified during the facility walkdown.

4.6.2.2 VOCs/SVOCs

Paints and thinners have been stored in the building, but no evidence of contamination was identified during facility walkdowns. Based on process knowledge, no other VOCs/SVOCs are suspected of having been used in the facility and contaminated the structure.

4.6.2.3 Beryllium

Based on process knowledge, no beryllium is suspected of having been used in the facility and contaminated the structure.

4.6.2.4 PCBs

The only PCBs in the building are in association with fluorescent light bulbs. Based on process knowledge, no other PCBs are suspected of having been used in the facility and contaminated the structure.

4.6.2.5 Asbestos

Based on facility inspection, asbestos is present within the structure in floor and ceiling tiles, and in thermal insulation.

4.6.3 Hazards Summary

Table 4-25 summarizes B381 hazards. Chemicals stored include paints, thinners, sealants, caulks, adhesives and petroleum products. No evidence of spills and related contamination were noted during facility walkdowns.

Table 4-25 B381 Hazards (part of SET 16)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	None
In-Process Nuc. Material	None
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	**Yes**
Mixed Waste Storage	None
Chem. Product Storage	None
Asbestos	**Yes**: ceiling and floor tile, and thermal systems insulation.
Lead/Heavy Metals	None. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	Some fluorescent light ballasts contain PCBs.
Other Chem. Hazards	None
Unique Physical Hazards	None

4.7 Building 371 Cluster Tanks

4.7.1 Radiological Hazards

As indicated below, one of the tanks had external contamination. Also, the interior of the four vapor body tanks and the spray dryer may contain residual radioactive material and may be contaminated.

4.7.1.1 Survey Area AA

This Survey Area includes diesel fuel/storage tank 262A, and liquid nitrogen storage tank 170 exterior to 371/374. This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are not present. Survey Area AA is not contaminated.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 30 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 28 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity. One of the tanks (Tank 4) listed in the instructions was a duplicate, which reduced the required number of measurements by two.

All of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were below the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.7.1.2 Survey Area BB

This Survey Area includes the first, second, third and forth effect vapor body tanks (Tanks 224 - 227 exterior to 371/374 containing water and sodium hydroxide). This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are present. Survey Area BB is contaminated, however, the activity may be from radon (see discussion below).

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were specified:

- 32 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

The following measurements were performed and documented:

- 32 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity and 1 m^2 surface scans for alpha activity.

Six of the total surface activity measurements on equipment for alpha activity and associated swipes for removable alpha and beta-gamma activity were above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The maximum value was for a location on the 4th effect vapor body tank, which had an alpha total surface activity of 1566 dpm/100 cm^2 indicating fixed contamination. However, it is possible that these gross alpha readings are due in whole or in part to radon decay products. Oxidized exterior surfaces are known to trap radon decay products. The issue will be investigated during in-process characterization and the pre-demolition survey.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area. Samples will be taken during IPC and PDS.

4.7.1.3 Survey Area CC

This Survey Area includes the product water tanks 163 & 164; cement silo 165; nitric acid tank 167 (a.k.a. D-222), potassium hydroxide storage tanks 168 (a.k.a. D-225) and 169 (a.k.a. D-842); and spray dryer tank 228 exterior to 371/374. This Survey Area is not radiologically posted.

Radiological survey results indicate that radiological hazards are not present except on one area of T168. Only one tank within Survey Area CC is contaminated. No other contamination was detected on the six other tanks.

Radiological Surveys

Radiological surveys were performed per the requirements of the RFETS Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, dated November 1999. The following measurements were required:

- 35 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

The following measurements were performed and documented:

- 35 total surface activity measurements on equipment with associated swipes for removable alpha and beta-gamma activity.

One of the total surface activity measurements on equipment for alpha activity was above the contamination limits prescribed in DOE Order 5400.5 and the RFETS Radiological Control Manual. The high value was located on a valve associated with potassium hydroxide storage tank 168 (a.k.a. D-225), which had an alpha total surface activity of 222 dpm/100 cm^2 indicating fixed contamination. However, it is possible that the gross alpha reading is due in whole or in part to radon decay products. Oxidized exterior surfaces are known to trap radon decay products. The issue will be investigated during in-process characterization and the pre-demolition survey.

The radiological survey requirements delineated in PRO-475-RSP-16.01 for this Survey Area were met or exceeded. Radiological survey results are included in the RLC project file.

Radiological Samples

No radiological samples were required for this Survey Area.

4.7.2 Chemical Hazards

Some of the tanks may contain residual materials (e.g., acid, caustic and process waste) and may be contaminated.

4.7.2.1 Lead and Other RCRA Metals

Metals may be present in sludges within the vapor body tanks and spray dryer tank. Toxic metals are not present in the other tanks

4.7.2.2 VOCs/SVOCs

VOCs/SVOCs may be present in sludges within the vapor body tanks and spray dryer tank. VOCs/SVOCs are not present in the other tanks.

4.7.2.3 Beryllium

Based on process knowledge, beryllium is not suspected of being present in sludges within the vapor body tanks and spray dryer tank, or having entered and contaminated any of the other tanks.

4.7.2.4 PCBs

Based on process knowledge, no PCBs are suspected of having entered and contaminated the tanks.

4.7.2.5 Asbestos

Based on inspections conducted, asbestos is present in the tanks as thermal insulation.

4.7.3 Hazards Summary

Table 4-26 summarizes hazards associated with the B371 Cluster tanks.

Table 4-26 B371 Cluster Tanks Hazards (SET 14)

HAZARDS	HAZARD DESCRIPTION
Radiological Contamination	Exterior contamination associated with Tanks 224 – 227 (the vapor effect tanks) and Tank 168. Tanks 224 – 228 may be internally contaminated. It is possible that the exterior elevated alpha readings are due in whole or in part to radon decay products.
In-Process Nuc. Material	**Yes**; materials in Tanks 224 – 228 (the vapor effect tanks and the spray dryer tank).
Nuc. Material Holdup	None
Other Rad. Mat'l (sources & product)	None
Rad. Waste Storage	None
Chem./Haz. Waste Storage	None
Mixed Waste Storage	None
Chem. Product Storage	**Yes;** Tank 167 (nitric acid), Tanks 168 & 169 (potassium hydroxide), Tank 170 (liquid nitrogen), and Tank 262A (diesel).
Asbestos	**Yes**: thermal systems insulation.
Lead/Heavy Metals	Tanks 224 – 228 (vapor effect tanks and spray dryer tank) may contain toxic metals and be internally contaminated. Lead in paint need not be analyzed unless paint is removed from substrate.
Beryllium	None
PCBs	None
Other Chem. Hazards	Tanks 224 – 228 (vapor effect tanks and spray dryer tank) may contain organic compounds and be internally contaminated.
Unique Physical Hazards	None

5.0 DECOMMISSIONING WASTE AND RECYCLABLE MATERIAL

After equipment has been removed from the facilities and the facilities have been decontaminated, the demolition of the B371 Cluster facilities will generate primarily uncontaminated rubble/structural construction debris, sanitary waste, and low-level radioactive waste. Most process-related equipment items, including ventilation systems, gloveboxes, and machinery are likely to be disposed of as low-level radioactive waste. The Site will be able to recycle most of the uncontaminated rubble/structural construction debris. A relatively small amount of waste will have to be disposed off-site as hazardous, toxic and asbestos-containing waste. It is expected that most of the beryllium contamination will be decontaminated. Table 5-1 presents volume estimates by waste and material type.

Table 5-1 B371 Cluster Waste and Recyclable Material Volume Estimates

Category	Sub-Category	Units	Total Volume/Wt.
Transuranic (TRU)	TRU	M^3	2,100
	TRU Mixed (TRM)	M^3	400
	Residues	M^3	4
	TRU/TRM Liquids	M^3	0.01
Low-Level (LL)	LL, including Asbestos	M^3	3,600
	LL - Structural Debris	M^3	4,100
	LL - Surface Contaminated Objects (SCO)	M^3	17,900
	LL - Contaminated Recycle Metal	M^3	0[a]
	LL – Liquids	M^3	0[b]
Low-Level Mixed (LLM)	LL – PCBs	M^3	3[c]
	LLM - RCRA Solids	M^3	150
	LLM - RCRA Liquids	M^3	4
Non-Rad/Regulated			
Hazardous/Toxic	Hazardous Waste	M^3	7
	PCBs	M^3	12
	Friable Asbestos	M^3	21
	Liquids	M^3	0.6
Sanitary	Routine Sanitary	Tons	0
	Non-Routine Sanitary	Tons	10,500
	Rubble/Structural Construction Debris	Tons	0
	Non-Friable Asbestos	Tons	39
Other	Salvage / PU&D	M^3	0[d]
	Rubble/Structural Construction Debris	M^3	28,000

Table 5-1 B371 Cluster Waste and Recyclable Material Volume Estimates (Continued)

	Radiological Test/Calibration Sources	M^3	0[d]
	Non-Contruction Scrap Metal/Recycle	M^3	0[d]

a. This waste type has typically included items such as contaminated lead and, depending on the results of current analyses, may include contaminated steel.
b. Volume represented as zero because waste will not be dispositioned as a separate wastestream. Low-level liquids anticipated include: liquids currently in the system, cerium nitrate solution used for metal surface decontamination, and hydrolazing water from wall and floor decontamination. The liquids currently in the system will be dispositioned through current treatment systems during deactivation. Cerium nitrate solution used for decontamination will be processed in the caustic waste treatment system. Hydrolazing water will be processed in either the B374 liquid waste treatment system or its decendent system.
c. The estimate is based on the actual data from the B779 Project. The actual volume from B779 was divided by the B779 LLW total and multiplied by the B371 LLW estimate.
d. It is expected that this waste will be generated during deactivation. However, the category is maintained in the event materials are generated outside deactivation.

6.0 DATA QUALITY ASSESSMENT

Data quality is assessed relative to the purposes for which the data were taken. Data quality was assessed relative to two (2) distinct data sets: the reconnaissance level characterization data (for Types 2 and 3 facilities) and the pre-demolition survey data (Type 1 facilities). In the case of reconnaissance level data, the purpose of the data is to 1) characterize hazards to human health or the environment in the context of consequent strip-out/decommissioning activities and 2) classification, or "typing", of buildings (and areas within buildings). Pre-demolition survey data was assessed for the purpose of ensuring that all results were adequate to support decisions regarding unrestricted release -- 1 Survey Unit encompassing 5 distinct facilities. This section explains the means by which the data were verified and validated to attain the described goals of the project. Requirements for satisfactory data quality are given in applicable K-H corporate policies (e.g., K-H, 1997, §7.1.4 and 7.2.2) and DOE Order 414.1, Quality Assurance, §4.b.(2)(b), as well as the MARSSIM (NUREG 1575, for PDS data).

Original DQOs were documented during the planning phase of the project within the characterization package (see Section 6.1.3 for all of the project's work-controlling documentation). The characterization package included both radiological and nonradiological requirements for the project. DQA for the RLC data was based on the following requirements and guidance documents:

- Quality Assurance, DOE Order 414.1
- EPA QA/G-8, *Guidance on Environmental Data Verification and Validation*, (Draft, August 1999)
- Lockheed Martin/DOE, Oak Ridge National Laboratory, 1997. *Evaluation of Radiochemical Data Usability.*
- *Analytical Services General Guidelines for Data Verification and Validation*, DA-GR01-v1-1, Kaiser-Hill (RFETS), December, 1997
- *Verification and Validation Guidelines for Inorganics Analysis*, DA-SS05 (PSA Module SSO5), Kaiser-Hill (RFETS), December, 1997
- *Verification and Validation Guidelines for Isotopics Determination by Alpha Spectrometry*, DA-RC01 (PSA Module RC01), Kaiser-Hill (RFETS), February, 1998
- *Radiological Survey/Sample Data Analysis,* PRO-478-RSP-16.04, Revision 0

With the exception of the two areas not surveyed (the roof of B374A and the top of the B373 pump house), data quality was satisfactory for the dual purposes of reconnaissance level characterization and pre-demolition surveys. All results are usable without qualification.

6.1 Verification/Validation

Verification of both radiological and non-radiological data set(s) corroborates that data produced and used by the project are documented and traceable per quality requirements. Specifically, verification confirmed the following:

- Format and content of the data are clearly presented relative to the project decisions (as summarized in the report and organized within the project file).
- Measurements are properly authenticated, dated, and labeled, allowing clear traceability to measurement locations and responsible technical personnel.
- Calibrations and periodic performance checks of all instrumentation were satisfactory relative to accuracy, precision, and bias.
- Count times of radiological surveys produced adequate sensitivity of measurements for comparison with action levels.

Validation consisted of a technical review of all data to ensure that proper methods/procedures and quality controls were implemented. Based on this technical review, any limitations (qualifications) of the data relative to project goals are listed and explained in the appropriate section. In addition to qualification of data, the DQA may also be described through PARCC parameters. PARCC parameters -- Precision, Accuracy, Representativeness, Comparability, and Completeness -- includes discussion on bias and sensitivity. The DQA discussion herein emphasizes the PARCC aspects of the data.

Samples collected for the project are managed through Report Identification Numbers, or RINs, as assigned by K-H Analytical Services Division. The laboratory quality controls, discussed in the following sections, are traceable through the RINs and laboratory batching. The 371 RLC produced the following RINs and associated sample types are listed below:

Sample Type/Location	RIN	Analytes
Transite B373, Cooling Tower	00A1226	Toxicity Characteristic Metals Isotopics
Sludge	00A1224	Toxicity Characteristic Metals Isotopics
Paint Scrapes, 371/374 Complex	00A1209 00A1210 00A1214	Isotopics Isotopics Isotopics
Concrete plugs, 371/374 Complex	00A1211	Toxicity Characteristic Metals Isotopics

6.1.1 Precision

Radiological Surveys/Samples

Precision of the radiological survey instrumentation was satisfactory based on periodic (daily) source checks within tolerances as specified in 3-PRO-112-RSP-02.01,

Radiological Instrumentation (Rev. 1, 8/24/98). The tolerance, within ±20% of a source check value, applies to all survey measurement types -- scans and static measures for total contamination (TSA) and swipes for removable. Any performance checks that exceeded the defined tolerance limits were corrected (repaired or replaced) prior to the instrument's use in the reconnaissance survey. Daily source check results are maintained by Radiological Operations in Building 549.

Precision of radiochemistry results was adequate based on acceptable results from laboratory duplicate analyses and project duplicates (blind to the lab). For lab precision, a ratio between the real result and the replicate result was compared with a test statistic to determine equivalency (stated differently, results were compared to determine if they were significantly different). All ratios sometimes called "duplicate error ratios" or "equivalency ratios" were within tolerance, and are reflected within the respected data packages (project file). Duplicate results for the project, indicative of sampling precision, were acceptable, as both real and duplicate results were well below action levels for each chemical of interest

Chemical Hazards

Precision of beryllium results was adequate, as all results were below the detection limit of 0.1 $\mu g/100cm^2$; lab duplicates were also within contractually required tolerances.

Repeatability of asbestos samples was not evaluated quantitatively due to the judgmental nature of the sampling approach, however, the method of analysis -- polarized light microscopy – yields excellent repeatability for determining concentrations of asbestos above vs. below the action level of 1% (ACM).

Precision of metals, as prepared through the TCLP, was adequate based on acceptable results from laboratory duplicate analyses and project duplicates (blind to the lab). For lab precision, a ratio between the real result and the replicate result was compared with a test statistic to determine equivalency (stated differently, results were compared to determine if they were significantly different). All ratios sometimes called "duplicate error ratios" or "equivalency ratios" were within tolerance, and are reflected within the respected data packages (project file). Duplicate results for the project, indicative of sampling precision, were acceptable, as both real and duplicate results were well below action levels for each chemical of interest.

6.1.2 Accuracy (And Bias)

Radiological Surveys/Samples

Accuracy of radiological surveys is satisfactory based on RFETS-programmatic annual calibrations that establish instrument efficiencies and sensitivities for all instrumentation used on this project. Daily source checks also provided periodic checks to ensure that all sensors are within accuracy tolerances during daily operations. Calibration and calibration check results are within the RFETS and industry-standard requirement of 20% of the applicable reference standard values.

Accuracy of radiochemistry results was controlled through periodic laboratory calibrations, use of lab control samples, and evaluation of tracer yields. Accuracy of radiochemistry was acceptable and within the industry standards of ±20% recovery for reference standard values (LCS). Tracer yields of less than 20% required reanalysis of the sample. Accuracies described herein translate to about 1 pCi/g and ±1 pCi/liter for all actinides of interest at or near contractually required minimum detectable concentrations (i.e., 0.3 pCi/g or pCi/l for 241Am, 239,240Pu; 1 pCi/g or pCi/l for the U species). Sample-specific accuracies are reported on the laboratory reports as a function of total error, which includes counting error and systematic error.

All blanks yielded no results greater than 0.1 dpm/sample, indicating no cross-contamination in the lab process, and no potential for high bias due to lab cross-contamination.

Chemical Hazards

Accuracy of beryllium results is adequate for the project based on satisfactory recoveries of an LCS and matrix spike for the batch. Blank samples yielded non-detectable levels, and thus potential cross-contamination and false positive results are not an issue.

Accuracy for asbestos volumetric concentrations is based on the semi-quantitative technique of petrography via polarized light microscopy. Analysts can typically quantify components to within several percent at high concentrations ranging to ~1% at low concentrations (i.e., presence or absence of the mineral of interest). Accuracy for the project is adequate, as the contrast between 0% and 1% is a clear distinction for the decision of "ACM " vs. "No ACM".

Accuracy for all toxicity characteristic metal results, including concrete, sediment, and transite matrices, was adequate based on LCS and MS % recoveries within tolerance limits (~±25%).

6.1.3 Representativeness

Samples and surveys are representative of the materials and locations of interest based on the following criteria:

- Familiarity with facilities -- multiple walk-downs and collaborations by and within the sampling team;
- Use of approved and controlled procedures, including:
  - K-H Module GR01, *General Lab Requirements*
  - K-H Module RC01, *Isotopic Determinations by Alpha Spectroscopy*

- K-H Module NR01, *Beryllium Filters* [including SW846 3051/OSHA ID-125G (ICP method)
- K-H Module SS05, *Inorganic Metals* [including SW846 methods 1311 (TCLP), 3005A/6010A/6020B (total metals), and 7470 (Hg)];
- IWCP T0102338, RFETS, 11/99, Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2
- IWCP T0103820, Core and Transite Sampling for Characterization of Buildings 371, 374, and 373 Cooling Tower
- Pro-1004-RSP-09.08, Revision 0, *Radioactive Material Transfer and Unrestricted Release Of Property, Waste, and Samples*.

A combination of both random and biased locations were used for survey/sample measurements; many of the radiological survey measurements were quasi-random, in that a random number generator was not used, but points were uniformly distributed throughout the area of interest. Biased locations were intentionally clustered about areas where previous contaminant-related activities were known to exist. Those Class 3/Type I facilities undergoing pre-demolition surveys – Buildings 373 (cooling tower), 374A (carpenter's shed), 377, 378 (pumphouses), and 381 (small cinder block structure) – were collectively addressed as one survey unit, and were surveyed consistent with a MARSSIM final status survey design. The MARSSIM design included the minimal number of measurements required to conclude, with 95% confidence, that activities within the Survey Unit are below unrestricted release criteria. In addition to MARSSIM requirements, smears and TSA measurements were also performed at each scanning location, which means that smears/TSAs were acquired at locations biased toward worst-case (contamination) scenarios – supplemental to randomly selected locations.

6.1.4 Completeness

Comparisons between *planned* sample and survey planning specifications with the actual quantity of usable sample and survey results allow an evaluation of completeness. Completeness of radiological paint scrape data is adequate as explained throughout Section 4, where planned and actual data are listed and discussed by Survey Area. The totals and breakdowns of planned surveys were determined by Radiological Engineering professional judgement and consensus approval by the responsible organizations (see signature cover page).

Radiological and metals (TCLP) results for bulk (concrete) samples are considered complete for Buildings 371 and 374, where 20 real and 3 QC (duplicate) samples were acquired; 2 real samples were not acquired due to accessibility problems, however, the absence of these results does not affect conclusions drawn by this report.

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Radiological and TCLP metals samples are complete for Building 373, where 3 real and 1 QC sample was taken from transite panels, as planned. The same sample types were also complete for sediment samples beneath Building 373, in a concrete sump, where 2 real samples were taken as planned.

As in the radiological context, sampling locations and frequencies for nonradiological analytes were dependent on judgmental sampling (resulting from site inspections performed by the characterization project team) and random sampling. Quality records for the data presented are managed in the Project File, Building 116, and will be submitted to the CERCLA Administrative Record within 30 days of report approval. Original data packages, which contain the complete compilation of laboratory analysis deliverables, are managed by K-H Analytical Services Division.

6.1.5 Comparability

All results presented are comparable with data of like contaminants of concerns on a site- and DOE-complex wide basis. This comparability is based on the following:

- Use of standardized engineering units in the reporting of measurement results;
- Use of documented and approved plans and procedures; and
- Thorough documentation of the planning and sampling/analysis processes, and data reduction into formats designed for making decisions based on the project's original DQOs.

6.1.6 Sensitivity

Sensitivities for all surveys and chemical analyses are adequate, based on detection limits and MDAs at levels well less than DQO decision criteria. Sensitivities for each survey, radiochemical, or analytical method are provided with the sample or survey results in their respective project file.

6.2 Summary

The data presented in this report have been verified and are qualified as valid and complete for comparison with applicable decision criteria relative to each contaminant of concern. All data sets (by location and analytical suite) comply with originally established DQOs relative to both reconnaissance level characterization and pre-demolition surveys, where RLC data supports initial waste estimates and definition of hazards (Types 2 and 3 facilities), and PDS data supports unrestricted release of Type 1 facilities.

7.0 FACILITY CLASSIFICATION

Based on the analysis of radiological, chemical and physical hazards, facilities in the 371/374 Building Cluster were classified pursuant to the RFETS Decommissioning Program Plan (DPP, K-H, 1998a). Classification was based on a review of historical and process knowledge, historical radiological and chemical data, and newly acquired RLC data, and will be subject to concurrence by the Colorado Department of Public Health and the Environment. DPP classification criteria are defined as follows:

- **Type 1** facilities are considered "free of contamination".
- **Type 2** facilities contain no significant or contamination or hazards, but are in need of decontamination. The extent of contamination is such that routine methods of decontamination should suffice and only a moderate potential exists for environmental releases during decommissioning.
- **Type 3** facilities contain significant contamination and/or hazards.

The facilities were classified as follows

FACILITY	CLASSIFICATION
Building 371	Type 3
Building 374	Type 2
Building 373	Type 1
Building 374A	Type 1
Building 377	Type 1
Building 378	Type 1
Building 381	Type 1
Tanks 163 – 165, 170, 262 & 262A	Type 1
Tanks 224 – 228 and 167 – 169	Type 2

B371, the only Type 3, presents significant radiological hazards due to highly contaminated areas (including HCAs and ARAs), ventilation systems, gloveboxes, tanks, and other equipment/systems. The Type 2 facilities (i.e., B374 and some of the Cluster tanks) are contaminated, but structural components and process equipment (e.g., tanks) can be either decontaminated to meet unrestricted release criteria using routine decontamination methods or removed per the RFCA Standard Operating Protocol for Facility Component Removal, Size Reduction, and Decontamination Activities. In addition, exterior contamination may be from naturally occurring radioactive material (i.e., radon decay products) and not from DOE-added material. Exterior contamination will be further investigated during in-process characterization. The Type 1 facilities are not contaminated, and present no radiological, chemical or physical hazards.

The Type 1 facilities were characterized in accordance with the requirements for Pre-Demolition Surveys, pursuant to The D&D Characterization Protocol (MAN-077-DDCP). To ensure that these facilities remain free of contamination and that Pre-Demolition Survey data remain valid, isolation controls will be established, and the facilities will be posted accordingly.

8.0 REFERENCES

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K-H Module NR01, Version A, *Beryllium Filters [including SW846 3051/OSHA ID-125G (ICP method)*

K-H Module *SS05 [including SW846 methods 1311 (TCLP), 3005A/6010A/6020B (total metals), and 7470 (Hg)];*

IWCP T0102338, RFETS, 11/99, *Radiological and Non-Radiological Characterization Package for the Building 371 Cluster, Revision 0, Volumes 1 & 2*

IWCP T0103820, *Core and Transite Sampling for Characterization of Buildings 371, 374, and 373 Cooling Tower*

Pro-1004-RSP-09.08, Revision 0, *Radioactive Material Transfer and Unrestricted Release Of Property, Waste, and Samples.*